

FIRE MANAGEMENT PLAN

Mount Rainier National Park

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Annual Fire Management Plan Reviews

MOUNT RAINIER NATIONAL PARK

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Mount Rainier National Park Fire Management Plan

TABLE OF CONTENTS

I	Introduction	01
II	NPS Policy and Relation to Other Plans	04
A	Laws	07
B	NEPA/Environmental Assessment	08
C	Relationship to Other Plans	08
D	Fire management Planning Background	09
III	Description of the Park and Region	10
A	Mount Rainier National Park	10
B	Surrounding Lands	11
C	Description of Adjacent Lands Fire Mgmt Goals	12
D	Historic Role of Fire at Mount Rainier National Park	12
1	Fire Ecology	12
2	Fire History	13
	Tables: Ancient and Recent Fire History	16
3	Fire Weather History	18
4	Fire Season	19
5	Fire Behavior	20
E	Fuel Model Types/Generalized Vegetation Types	22
1	Western Hemlock Zone	22
2	Pacific Silver Fir Zone	23
3	Mountain Hemlock Zone	24
4	Subalpine Fir Zone	25
5	Alpine Zone	26
	Map of fire fuel models	27
F	Cultural Resources	28
1	Prehistoric and historic Archeology	28
2	Historic Structures	28
3	Cultural Landscapes/Mount Rainier NHL	29
4	Ethnography	30
G	Wilderness	31
IV	Scope of Wildland Fire Management Program	32
A	Fire Management Goals and Objectives	32
B	Descriptions of Wildland Fire Management Strategies	36
1	Appropriate Management Response	37
2	Wildland Fire Suppression	37
3	Wildland Fire Use for Resource Benefits	37
4	Fuels Management	38
a	Prescribed Fire	38
b	Hazard Fuel Reduction: Manual/Mechanical Treatment	39
c	Hazard Fuel Reduction: Debris Burning	40
5	Ecosystem Management	40

Map of Fire Management Units	41
C Fire Management Units	42
1 FMU-1: Suppression Unit	42
Fire Management Strategies	42
Strategic and Measurable Fire Management Objectives	43
Management Considerations to Operational Implementation	43
Park Operations and Visitor Services	43
Physical and Biotic Characteristics	44
Areas of Special Concern	44
Nisqually Entrance Administrative Area (Map)	44
Longmire Administrative/Visitor Use Area (Map)	44
Paradise Administrative/Visitor Use Area (Map)	45
White River Entrance Administrative Area (Map)	45
Ohanapecosh Administrative/Visitor Use Area (Map)	46
Sunrise Administrative/Visitor Use Area (Map)	46
Tahoma Woods Administrative Headquarters Area (Map)	47
2 FMU-2: Wildland Fire Use Unit	48
Strategies	48
Management Considerations to Operational Implementation	48
Physical and Biotic Characteristics	49
Areas of Special Concern	49
Park Operations and Visitor Services	49
Backcountry Historic Structures and Utilities	52
Socioeconomic	52
Safety	52
V Wildland Fire Management	54
A Wildland Fire Suppression Program	54
1 Wildland Fire Prevention Program	54
2 Fire Weather Forecasting	55
3 Pre-suppression Preparedness	56
4 Pre-attack Preparedness	56
5 Step-Up Plan (Table)	57
6 Fire Detection	58
7 Fire Reporting and Qualifications	58
8 Mobilization Plan & Communication	59
9 Initial Public Safety Plan	61
10 Determination of Wildland Fire Potential/Decision Flow Chart	62
11 Suppression Conditions	62
12 Minimum Impact Suppression Tactics	62
13 Burned Area Emergency Rehabilitation	65
14 Fire Investigation	65
15 Fire Funding & Records	65
VI Wildland Fire Use Program	67
A Description	67
B Decision-Making and Monitoring	67
C FMU-2: Wildland Fire Use Unit	68
D Management Considerations to Operation Implementation	68
E Potential Impacts of Fire Management Plan Implementation	69
F Public Safety Issues and Procedures	71
G Public Information and Interpretation	71
H Records and Documents	73

VII	Fuels Management Program	74
A	Hazard Fuels Management	74
B	Mechanical Fuels Reduction Program	75
C	Hazard Fuels Reduction	76
1	Limited Debris Burning	77
2	Use of Fuel Breaks	77
3	Table A: Detailed Description of Treatment	79
D	Prescribed Fire Program	83
1	Exceeding Existing Prescribed Fire Plan	83
2	Air Quality and Smoke Management	83
E	Wildland fire implementation procedures	84
VIII	Fire Management Organization and Responsibilities	87
A	Fire Management Organization & Roles	87
B	Incident Command System	89
1	Interagency Incident Management Team Briefing	90
2	Superintendent Briefing	90
3	Incident Commander Briefing	91
4	Resources	92
C	Cooperators	95
1	Interagency Contacts	95
D	Administration Procedures	96
E	Aircraft Operations	97
1	Water use in Aircraft Operations	98
IX	Fire Research & Monitoring	100
A	Fire monitoring guidelines	100
X	Public Safety	110
XI	Protection of Sensitive Resources	110
XII	Fire Critiques and Annual Plan Reviews	111
XIII	Consultation and Coordination	111
IV	Appendices	114

APPENDICES

MOUNT RAINIER NATIONAL PARK FIRE MANAGEMENT PLAN

1	References Cited	1
2	Definitions	3
3	Special Status Species List	7
4	Administrative and Cultural Facilities	16
5	NEPA/NHPA Compliance	19
6	Accessing the Fire Call Up List	20
7	Annual Fire Program Outline	21
8	Staffing Plan	23
9	Interagency Agreements	24
10	Delegation of Authority	25
11	Dispatch Procedures for Out of Park Fires	27
12	Readiness Checklist	30
13	Pre-attack Planning Checklist	39
14	Pre-season Risk Analysis	40
15	Fire Monitoring Guide	41
16	Fire Report Form, DI-1202	44
17	Wildland Fire Implementation Plan (WFIP)	46
18	Wildland & Prescribed Fire Complexity Rating Worksheet	60
19	Periodic Fire Assessment Instructions	72
20	Wildland Fire Situation Analysis (WFSa)	76
21	A Guide for Assessing Fire Complexity	89
22	Wildland Fire Observation and Summary Fire Behavior Report	91
23	Minimum Impact Suppression Tactics (MIST) Checklist	92
24	Prescribed Burn Plan Format	101
25	Parameters for Conducting Prescribed Fires	109
26	Go/No-Go Checklist	110
27	Fire Prevention Plan	111
28	Incident Intelligence Report (ICS 209)	112
29	Records and Reports	115
30	Minimum Tool Form	116
31	Aircraft Use Request	118
32	Approved Water Sources	123
33	Standard Fire Orders and Watch Out Situations	125
34	Key Fire Contact List	126

I. INTRODUCTION

This document is the Fire Management Plan (FMP) for Mount Rainier National Park (MORA). The FMP environmental assessment is attached in Appendix 5. Upon issuance of the Decision Notice, this plan will meet the requirements of the National Environmental Policy Act (NEPA) as well as the National Historic Preservation Act. (NHPA)

Mount Rainier National Park encompasses 235,625 acres on the west side of the Cascade Range, about 65 miles southeast of Seattle and 65 miles west of Yakima. The park was established in 1899 “...for the benefit and enjoyment of the people. . .” Regulations within the park were enacted to “provide for the preservation from injury or spoliation of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition” (Mount Rainier National Park Organic Act 1899).

The FMP delineates the operational processes that MORA managers will follow in the event of a wildland fire or in the proposal and implementation of prescribed fire projects as well as hazard fuel reduction projects within park boundaries. The plan defines levels of protection needed to insure personnel and public safety, protect facilities and resources, and restore and perpetuate natural processes, given current understanding of the complex relationships in natural ecosystems.

All decisions regarding wildland fire suppression and prescribed fire will consider environmental and cultural impacts. NPS staff and, as appropriate, the public will participate in the review process.

RM-18 Wildland Fire Management Guidelines requires that all parks with vegetation capable of sustaining wildland fire develop a fire management plan (FMP). (Director's Order #18, Wildland Fire Management, 12/01/97)

This plan is tiered to the MORA Resource Management Plan and has been developed to assist park management in achieving resource-based objectives identified in the MORA Resource Management Plan (RMP) and General Management Plan (GMP) (2001).

Mount Rainier National Park contains outstanding examples of diverse vegetation communities ranging from old growth forest to sub-alpine meadows and ancient alpine heather. The park is a remnant of the once widespread primeval Cascade ecosystem where fire is a rare but catastrophic agent of forest change. The wet climate of the Pacific Northwest results in a long fire cycle with relatively low natural fire incidence. Lightning is the primary source of historic fire ignition in the park. Some occurrence of fire associated with prehistoric occupation in the park and surrounding areas has also been noted but it is not well documented.

Since the early to mid-1900s widespread fire suppression has occurred in this eco-region. Even so, wildfires have been the most important agent of forest change in and near the park and have affected all but a small fraction of the forested area during the last 1,000 years (Franklin 1988). Studies of natural fire rotation (the time it takes for fire to burn over and reproduce an area) show approximately 465 years for the pre-European era in the park and 226 years for the post-European era. Because of the comparatively short period of human management of Mount Rainier National Park (just over 100 years), there has likely been only moderate change of the park's natural fire rotation cycle in forested areas.

The primary purpose of the Fire Management Plan is to return fire as a natural ecosystem process to Mount Rainier National Park. In fulfilling this purpose, the equally important considerations of protecting life and property are of utmost concern.

Without a currently approved fire management plan, Director's Order 18: Wildland Fire Management (NPS 1998), states that "park areas must take an aggressive suppression action on all wildland fires, taking into account firefighter and public safety and resources to be protected within and outside the park." Director's Order 18 and its accompanying Reference Manual (NPS 2001) of the same number and title reiterated the need for Fire Management Plans to meet new guidelines.

According to National Park Service Management Policies (NPS 2001:4:38), "all NPS Units with vegetation that can sustain fire must have a Fire Management Plan" to guide a fire program that responds to natural and cultural resources management objectives; provides for the safety of park visitors, employees, neighbors and developed facilities; and addresses potential impacts to adjacent public and private property.

Fire Management Plans are also dictated by the Department of Interior's *Departmental Manual* for all lands administered by the Department (USDI 1997).

For many decades, beginning with park establishment, all fires occurring in the park were suppressed. Despite the fact that future fire planning, [beginning with the revision of the Fire Control Plan (1979)] focussed on returning the park to a natural fire regime, most fires occurring in the park continued to be suppressed and prescribed fire was not used.

Increased understanding of the role of fire, as a result of gathering scientific data, has led park managers to conclude that the total exclusion of natural, lightning-caused fires from the park ecosystem can cause very undesirable effects, including a loss of diversity or vigor in vegetation and wildlife. The National Park Service considers natural fire a viable ecosystem process that must be engaged in its natural role in parks if the agency is to fulfill its mission of preserving park resources and natural processes for future generations. Because fires have the potential to harm visitors, impact adjacent lands and to have significant short and long-term resource impacts, park managers need to ensure wildland fire management objectives are clearly stated and management processes are utilized that minimize risk to acceptable levels.

The primary goals of the Mount Rainier National Park Fire Management Plan are to protect life and property and to preserve sensitive natural and cultural resources, while ensuring the perpetuation of natural ecosystem processes. The plan incorporates a detailed operational program of actions to carry out the fire management policies and objectives stated herein.

Fire Management Plans are both planning and operational documents that ensure the protection of life and property and sensitive natural and cultural resources, while advocating the perpetuation of natural ecosystem processes.

Mount Rainier National Park's Fire Management Plan will:

- meet the requirements of NPS Management Policies (2001);
- fulfill the ecosystem management goals in the park General Management Plan (2001) and Natural and Cultural Resources Management Plan (1999);
- meet the requirements of the National Environmental Policy Act and other natural and cultural resources related laws; and
- Implement a strong fire management program for the park that will enable natural fires to approximate natural fire rotation in the park ecosystem.
 - provide for safety considerations for park visitors, employees, neighbors, and developed facilities;
 - Address potential impacts to public and private property adjacent to the park (Management Policies 2001, 4.5, 38).

Authorities

1) Fire Management

Authority for fire management is found in 16 USC Sec. 1 (August 25, 1916), which states that the agency's purpose:

..is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

This authority was clarified in the National Parks and Recreation Act of 1978:

Congress declares that...these areas, though distinct in character, are united...into one national park system....The authorization of activities shall be construed and the protection, management, and administration of these areas shall be conducted in light of the high public value and integrity of the National Park System and shall not be exercised in derogation of the values and purposes for which these various areas have been established, except as may have been or shall be directly and specifically provided by Congress."

2) Fire Management Funding

The authority for FIREPRO funding (Normal Fire Year Programming) and all emergency fire accounts is found in the following authorities:

Section 102 of the General Provisions of the Department of Interior's annual Appropriations Bill provides the authority under which appropriated monies can be expended or transferred to fund expenditures arising from the emergency prevention and suppression of wildland fire.

P.L. 101-121, Department of the Interior and Related Agencies Appropriation Act of 1990, established the funding mechanism for normal year expenditures of funds for fire management purposes.

31 US Code 665(E)(1)(B) provides the authority to exceed appropriations due to wildland fire management activities involving the safety of human life and protection of property.

3) Procurement /Administrative Activities

Authorities for procurement and administrative activities necessary to support wildland fire suppression missions are contained in the Interagency Fire Business Management Handbook.

4) Cooperative Agreements

Authorities to enter into agreements with other Federal bureaus and agencies; with state, county, and municipal governments; and with private companies, groups, corporations, and individuals are cited in DO-20 (Federal Assistance and Interagency Agreements). These include the Reciprocal Fire Protection Act of May 27, 1955 (42 USC 815a; 69Stat 66).

Authority for interagency agreements is found in Interagency Agreement between the Bureau of Land Management, Bureau of Indian Affairs, National Park Service, U.S. Fish and Wildlife Service of the United States Department of the Interior and the Forest Service of the United States Department of Agriculture, State of Oregon and the State of Washington (1998). Authority for rendering emergency fire or rescue assistance outside the National Park System is the Act of August 8, 1953 (16 USC 1b(1)) and the Departmental Manual (910 DM)(1.)

5) Fire Management Plan Implementation

Authorities for implementing this plan are identified in RM-18.

II. NATIONAL PARK SERVICE POLICY and RELATION TO OTHER PLANS

Authority for the Fire Management Plan is contained in the legislation creating Mount Rainier National Park. The park was established in 1899 “ . . .for the benefit and enjoyment of the people . . . ” The Act further directs the Secretary of Interior to establish regulations within the park to “provide for the preservation from injury or spoliation of all timber, mineral deposits, natural curiosities, or wonders within said park, and their retention in their natural condition” (Mount Rainier National Park Organic Act – Title 16, USC, Section 91, 30 Stat 993, March 2, 1899).

Subsequent congressional action set aside 216,855 acres or approximately 97 percent of the park’s 235, 625 acres as Wilderness (Public Law 100-668, November 16, 1988). Later, in 1997, approximately three percent of the park (or 1,700 acres) encompassing most of the park’s developed areas, roads, bridges and the Wonderland and Northern Loop trails were listed on the National Register of Historic Places as the Mount Rainier National Historic Landmark District (See Appendix 4). The National Historic Landmark District identifies the park as the *best and most complete example* of the conception and idea of the American national park as it was embodied and implemented through the NPS master planning effort of the early 20th century. Based on the Clean Air Act (1977), Mount Rainier National Park is in a mandatory class I air quality area. A class I designation allows very little additional deterioration of air quality. Surrounding wilderness areas, including the Goat Rocks Wilderness, the Alpine Lakes Wilderness and the William O. Douglas Wilderness are also mandatory class I areas.

Department of the Interior *Departmental Manual*, DM 910 (USDI 1997) sets policy and priorities related to wildland fires occurring on any DOI lands:

Wildland fires, whether on lands administered by the Department or adjacent thereto, which threaten life, man-made structures, or are determined to be a threat to the natural resources or the facilities under the Department’s jurisdiction, will be considered emergencies and their suppression given priority over normal Departmental programs.

Bureaus will give the highest priority to preventing the disaster fire - the situation in which a wildfire causes damage of such magnitude as to impact management objectives and/or socio-economic conditions of an area. However, no wildland fire situation, with the possible exception of threat to human survival, requires the exposure of firefighters to life threatening situations.

Within the framework of management objectives and plans, overall wildfire damage will be held to the minimum possible giving full consideration to:

- (1) an aggressive fire prevention program;*
- (2) the least expenditure of public funds for effective suppression;*
- (3) the methods of suppression least damaging to resources and the environment; and*
- (4) the integration of cooperative suppression actions by agencies of the Department among themselves or with other qualified suppression organizations.*

The Department Manual also identifies the need for fire management plans to guide resource management objectives and to provide consistency in managing prescribed fire.

Prescribed fires...may be used to achieve agency land or resource management objectives as defined in the fire management plans. Prescribed fires will be conducted only when the following conditions are met:

- a. Conducted by qualified personnel under written prescriptions.*
- b. Monitored to ensure they remain within prescription.*

Prescribed fires that exceed the limits of an approved prescribed fire plan will be reclassified as a wildland fire. Once classified a wildland fire, the fire will be suppressed and will not be returned to prescribed fire status.

In summary, the Departmental Manual provides the authority for the prevention, pre-suppression, control and suppression of fire on lands or threatening lands under the jurisdiction of the DOI.

NPS Management Policies (2001, 4.1.5, 30) summarizes the intent to allow natural processes to predominate in parks:

The service will re-establish natural functions and processes in human disturbed natural systems in parks unless otherwise directed by Congress. Landscapes disturbed by natural phenomena, such as landslides, earthquakes, floods, hurricanes, tornadoes and fires, will be allowed to recover naturally unless manipulation is necessary to protect park developments or visitor safety. Impacts to natural systems resulting from human disturbance include. . . and the disruption of natural processes. The Service will seek to return human-disturbed areas to the natural conditions and processes characteristic of the ecological zone in which the damaged resources are situated. The Service will use the best available technology, within available resources, to restore the biological and physical components of these systems, accelerating both their recovery and the recovery of landscape and biological-community structure and function.

NPS Management Policies (2001, 4.5, 38) states the need for effective fire management planning to maintain the natural role of fire in parks:

Naturally ignited fire is a process that is part of many of the natural systems that are being sustained in parks. Human-ignited fires often cause the unnatural destruction of park natural resources. Wildland fire may contribute to or hinder the achievement of park resource objectives. Therefore, park fire management programs will be designed to meet park resource management objectives while ensuring that firefighter and public safety are not compromised.

All fires burning in natural or landscaped vegetation in parks will be classified as either wildland fires or prescribed fires. All wildland fires will be effectively managed through application of the appropriate strategic and tactical management options. These options will be selected after comprehensive consideration of the resource values to be protected, firefighter and public safety, and costs. Prescribed fires are those fires ignited by park managers to achieve resource management and fuel treatment objectives. Prescribed fire activities will include monitoring programs that record fire behavior, smoke behavior, fire decisions, and fire effects to provide information on whether specific objectives are met. All parks will use a systematic decision-making process to determine the most appropriate management strategies for all unplanned ignitions, and for any prescribed fires that are no longer meeting resources management objectives.

Management Policies (2001) further states that without an approved fire management plan, parks must immediately suppress all wildland fires, taking into consideration park resources and values, firefighter and public safety and costs.

With respect to wilderness, fire management in parks is to be carried out consistent with the “minimum requirement” concept defined in Director’s Order #41: Wilderness Preservation and Management. In addition the overall goal, with respect to suppression activities in parks, is accomplishment in a way that minimizes impacts of the suppression action and the fire and which is commensurate with effective control, firefighter and public safety and the resource values to be protected.

NPS Management Policies are further clarified in Director’s Orders (DO). DO #18: Wildland Fire Management (November 1998) sets the goals of fire management in the National Park System stating that the NPS will administer its fire management program in a way that will:

- a. Achieve maximum overall benefits and minimize damages of wildland fire use within the framework of land use objectives and resource management plans while giving primary consideration to firefighter and public safety.
- b. Educate employees and the public about the scope and effect of wildland fire management, including fuels management, resource protection, prevention, hazard/risk assessment, mitigation and rehabilitation, and fire’s role in ecosystem management.
- c. Stabilize and prevent further degradation of natural and cultural resources lost in and/or damaged by impacts of wildland fires and/or fire management activities.
- d. Maintain the highest standards of professional and technical expertise in planning and safely implementing an effective wildland fire management program.
- e. Integrate fire management with other aspects of park management.
- f. Manage wildland fire incidents in accordance with accepted interagency standards, using appropriate management strategies and tactics and maximize efficiencies realized through interagency coordination and cooperation.
- g. Scientifically manage wildland fire using best available technology as an essential ecological process to restore, preserve, or maintain ecosystems and use resource information gained through inventory and monitoring to evaluate and improve the program.

- h. Protect life and property and accomplish resource management objectives, including restoration of the natural role of fire in fire-dependent ecosystems.
- i. Effectively integrate the preservation of wilderness, including the application of “minimum requirement” techniques into all activities impacting this resource.

Operationally, DO – 18 directs the park to:

- make firefighter and public safety its first priority in all fire management activities;
- to ensure that fire personnel meet appropriate qualifications for incident assignments;
- to equip firefighters with appropriate personal protective equipment (PPE), based on incident assignments;
- to comply with the National Wildfire Coordinating Group (NWCG) and NPS fitness and other standards for park and other fire personnel;
- to implement core basic training requirements;
- to systematically analyze fire incidents that result in human entrapment, fatalities or serious injuries;
- to follow all established safety standards and risk management standards; and
- to use job hazard analyses for potentially hazardous fire management activities and out of the ordinary PPE use.

In addition, specific standards were set for Fire Management Plans; interagency coordination; training, qualifications and certification; preparedness, prescribed fire operations, burn plans, fire monitoring, fuels management, debris disposal, certification and evaluation and review; burned area emergency rehabilitation, research and fire funding/tracking (FIREPRO), business and personnel management.

Chapter 4 of the DO – 18 Reference Manual (RM – 18): *Wildland Fire Management* specifically identifies the components of fire management plans. Although the plans are considered operational in nature, they are public documents. By the same token, the plans are to be understood and carried out by NPS staff. Fire management plans must be directly related to Natural and Cultural Resource Management Plans and must, therefore, help to achieve resource management objectives.

A. LAWS THAT REGULATE FIRE MANAGEMENT PLANNING IN THE NPS INCLUDE:

- **Antiquities Act** (PL Chapter 3060, 34 Stat 225, 16 USC 431-433)

This act enforces the protection of archeological sites and objects under the jurisdiction of federal agencies.

- **Archaeological Resources Protection Act** (P.L. 96-95, Stat 721, 16 USC470aa-II)

Enacted to prevent the illegal excavation and possession of archeological resources located on federal, other public and Indian lands, this act recognized that the Antiquities Act was inadequate in both defining archeological resources and in establishing penalties.

- **Clean Air Act** (PL Chapter 360, 69 Stat 322, 42 USC 7401 *et seq.*)

The purpose of this act is to protect and enhance the nation's air quality to promote public health and welfare. It established a program to prevent significant deterioration of air quality in clean air regions of the U.S. This program established national standards "to preserve, protect and enhance the air quality in national parks, monuments, national seashores and other areas of special natural, regional, recreational, scenic or historic value."

- **Clean Water Act** (Federal Water Pollution Control Act) (PL 92-500, PL 100-433, 86 Stat 816, USC 9, sec. 1251 *et seq.*, as amended, 33 USC sec. 1251-1376, and 1987 Federal Water Quality Act)

This act established federal regulation of the nation's waters and ensures that states set and enforce water quality standards to meet EPA minimum guidelines. It sets limitations for pollution, establishes a permit for discharge of dredged or fill material and authorized a National Wetlands Inventory.

- **Endangered Species Act** (PL 93-205, 87 Stat 884, 7 USC 136, as amended)

This act requires federal agencies to ensure that their activities (authorized, funded or implemented) will not jeopardize the existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species.

- **National Environmental Policy Act** (PL 91-190, 42 USC 4321 *et seq.*, 83 Stat 852, 42 USC 4332, as amended)

NEPA is the basic charter for national environmental protection. It sets national policy for environmental protection and requires federal agencies to ". . .plan and carry out their activities. . ." so as to protect and enhance the quality of the environment. NEPA requires an interdisciplinary approach to evaluate and publicly disclose the impacts of federal proposed actions.

- **National Historic Preservation Act** (PL 89-665, 80 Stat 915-919, 16 USC 470 *et seq.*)

This act established a federal historic preservation program, including the National Register of Historic Places. Section 106 of the act requires the evaluation of impacts to districts, sites, buildings, structures, and objects important in American history.

- **National Park Service Organic Act** (PL Chapter 408, 39 Stat 535 *et seq.*, 16 USC 1)

This act established the National Park Service and declared its mission.

- **Redwood National Park Act** (PL 95-250, 92 Stat 163, as amended)

This act established consistency in the way in which all national parks are managed. The NPS is mandated to afford the highest standards of protection and care to park resources; no decision can compromise these resource values, except where specifically authorized by law.

- **Wilderness Act** (PL 88-577, 78 Stat 890, 16 USC 1131 *et seq.*)

This act established the National Wilderness Preservation System. Federal agencies are required to provide for their use now and in the future and to protect and preserve their wilderness character. Section 4 of the Wilderness Act, "Limitations of Use and Activities," defines prohibited uses and

special provisions. Section 4 (c) defines minimum requirements for the administration of wilderness including those involving emergencies: prohibiting the use of motorized equipment and allowing no landing of aircraft. Section 4 (d), "Special Provisions," provides for "... use of aircraft where ... these uses have already become established...such measures may be taken as may be necessary in the control of fire."

In addition, the following Executive Order applies:

Protection of Wetlands (EO 11990, 1977 42 FR 26961, 3 CFR 121 (Supp 177), 42 USC 4321)

This EO furthers NEPA policies by directing federal agencies to "...avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative ..."

B. ENVIRONMENTAL ASSESSMENT

The Environmental Assessment (Appendix 5) is prepared to satisfy the requirements of the National Environmental Policy Act (NEPA) (1969), as amended. This Act requires the documentation and evaluation of potential impacts resulting from federal actions on lands under federal jurisdiction. An Environmental Assessment discloses the potential environmental consequences of implementing the proposed action and other reasonable and feasible alternatives.

C. RELATIONSHIP TO OTHER PLANS

The General Management Plan, Natural and Cultural Resources Management Plan and Wilderness Management Plan all contain goals or objectives that relate to managing fire in the park.

The Mount Rainier *Draft General Management Plan* (December 2000) includes the following resource stewardship and protection goals.

- *Natural and cultural resources and associated values of Mount Rainier National Park are protected, restored and maintained in good condition and managed within their broader ecosystem and cultural context.*
- *Mount Rainier National Park contributes to knowledge about natural and cultural resources and associated values; management decisions are based on adequate scholarly and scientific information.*
- *Establish and maintain inventory and long-term monitoring programs for measuring the status and health of the park's natural, cultural and social resources.*
- *Plant communities and the processes governing them will continue unaltered in the majority of the park.*

The GMP also includes the following strategies to enhance ecosystem management (including re-establishment of the historic role of fire) beyond the park boundary.

- Cooperative agreements will continue to be sought with the U.S. Forest Service and other adjacent land management agencies to protect ecosystem habitat and wildlife corridors.
- The park will continue to develop cooperative agreements, partnerships and other feasible arrangements to set an example in resource conservation and innovation, and to facilitate research related to park resources and their management.

The *Natural and Cultural Resources Management Plan* (NCRMP) (1999) identifies fire management as an issue and within the context of project statements identifies proposed goals/objectives.

According to the NCRMP (Integrated Project Statement I-906.000: Conduct Natural Fire Management Program), wildfires have essentially been suppressed in and on lands surrounding the park since park establishment in 1899. These suppression practices have reduced the amount and extent of fire in a way not consistent with the historic role of fire. Suppression of all fires has altered the ability of the ecosystem to function naturally, leading to an increased probability of catastrophic fire over time. The plan recommends adopting a new Fire Management Plan consistent with meeting resource objectives and then implementing it.

The use of prescribed fires can enable the park to restore the historic role of fire. The use of prescribed fire is called for to accomplish resource objectives (while burning in a predetermined prescription). It also continues to call for using appropriate suppression strategies for fires that do not meet established criteria.

The exclusion of natural (lightning) fires from park ecosystems would cause unnatural effects as a result of increasing fuel accumulations. Eventually, loss of diversity in vegetation and wildlife and a degradation of ecosystem health may take place. To curtail these effects and continue a process of natural disturbance, the use of naturally ignited fires will contribute to the attainment of resource management objectives.

With respect to fire management in wilderness, the NCRMP calls for implementing a new Fire Management Plan, utilizing minimum fire suppression techniques where and when appropriate and for rehabilitation of areas impacted by fire suppression activities (Integrated Project Statement I-601.000: Manage Wilderness According to Park's Wilderness Management Plan).

D. FIRE MANAGEMENT PLANNING BACKGROUND 1979 TO PRESENT

The Fire Control Plan (1979) focused on ensuring reasonable protection of park structures and facilities and suppression of wildfires. The Fire Management Plan (1988) called for broader use of fire in an ecosystem (primeval wilderness character) context to return fire and fire effects to their natural role in the park. Its objectives included:

- enabling naturally occurring fires to burn within designated prescriptions,
- using prescribed fire as a tool to restore ecosystem processes,
- suppressing all human-caused fires and fires within established exclusion zones,
- expanding ongoing public education,
- mechanical removal of hazardous fuels near historic and administrative facilities,
- establishing and maintaining interagency cooperation,
- maintaining trained personnel; and
- systematizing fire procedures, standards and responsibilities in the park.

Under the previously selected alternative, the park was divided into three zones: a fire exclusion zone, a conditional zone and a prescribed natural fire zone. All naturally occurring fires within the conditional and prescribed natural fire zones were initially to be considered natural prescribed fires. From there, each ignition would be analyzed and declared either a prescribed natural fire or a wildfire.

A change in NPS fire management policy and revisions to key documents made the 1988 Fire Management Plan obsolete, pending a revision that incorporated these changes. This plan is that revision.

III. DESCRIPTION OF THE PARK AND REGION

A. MOUNT RAINIER NATIONAL PARK

Mount Rainier National Park was recognized as a significant area when the U.S. Congress established it as the nation's fifth national park in 1899. Tahoma Woods, the park's outlying administrative area was added in 1963.

As mentioned above, in 1988, the Mount Rainier Wilderness was designated by Congress and later, in 1997, the National Historic Landmark District was established. It encompassed and expanded five previously designated historic districts (Longmire, Paradise, Sunrise, White River and Camp Muir).

The park is comprised of 235,625 acres in west central Washington, on the western slope of the Cascade Range. Eighty three percent (196,181 acres) of the park lies in Pierce County and 17 percent (39,444 acres) is in Lewis County. The park's northern boundary is approximately 65 miles southeast of the Seattle-Tacoma metropolitan area and 65 miles west of Yakima (see Park Vicinity and Adjacent Land Ownership maps). The elevations of the park range from about 1,700 feet above sea level to 14,411 feet at the summit of Mount Rainier.

The focal point of the park is the towering, snow and ice-covered volcano, a prominent landmark in the Pacific Northwest. The base of the volcano spreads over an area of about 100 square miles. Mount Rainier is the second most seismically active and most hazardous volcano in the Cascade Range. The 26 major glaciers that flank the upper mountain cover 35 square miles. Below, steep, glaciated valleys, and ice carved peaks dominate the park landscape. The Carbon, Mowich, White, West Fork White, Nisqually, South Puyallup, and North Puyallup rivers and their tributaries carry water from Mount Rainier to the Puget Sound and the Ohanapecosh flows into the Cowlitz River and on into the Columbia River. Over 470 mapped rivers and streams, 382 mapped lakes and ponds, and more than 2,500 acres of wetlands, numerous waterfalls and mineral springs characterize this park in the Cascades.

Mount Rainier's scenic landscapes – including the dense lower old-growth forests, the magnificent display of subalpine wildflowers, and the mountain itself – have attracted people for generations. The mountain is a destination for snow and ice climbers throughout the world. About 2.0 million people visit the park annually, with most visitation (75 percent) occurring between June and September.

Park vegetation is diverse, encompassing three ecological zones. Above 6,000 feet or tree line and comprising approximately 19 percent of the park is the alpine zone, generally consisting of snow, ice, rock and fragile alpine plants. From about 5,000 feet to tree line and covering about 23 percent of the park is the subalpine zone, characterized by scattered stands of sub alpine fir, and heather and grass meadows. Below the sub alpine lies the forest zone, occupying about 58 percent of the park and dominated by western hemlock, silver fir, Douglas fir and western red cedar and other species.

In addition to its natural wonders, the national park has a long history of human activities. The area was used by Native Americans for hunting and gathering, as well as for spiritual and ceremonial purposes. In the early 20th century miners, climbers, and tourists, among others, came into the area. The establishment of the park, and subsequent planning and development for visitor use and landscape protection constitutes an important chapter in the development of the American park idea. As a result, the park has rich and diverse cultural resources, including prehistoric and historic archeological resources, historic structures and cultural landscapes.

At least five federally recognized tribes have traditional association with Mount Rainier:

- 1) Muckleshoot Indian Tribe
- 2) Puyallup Tribe of Indians
- 3) Cowlitz Indian Tribe
- 4) Nisqually Indian Tribe, and the
- 5) Yakama Indian Nation

Important treaties include the Treaty with the Yakama (1855), the Treaty of Medicine Creek (1854), and the Treaty of Point Elliot (1855). Also of note is the presence of the Cowlitz Tribe at negotiations for the Chehalis River Treaty of 1855.

Ethnographic evidence demonstrates historical activity in the park, and current indicate ongoing contemporary uses of the park by Indian people. As the park broadens its research and collaborative efforts with tribal groups, it is likely that traditional Native American uses of Mount Rainier will become better understood. Partnerships provide an opportunity for native tribes and the park to cooperate in mutually beneficial efforts for the purpose of preserving the park's resources to their fullest extent and highest level of integrity (National Park Service 2001).

B. SURROUNDING LANDS

The park is bordered primarily by U.S. Forest Service land, including the

- Mt. Baker-Snoqualmie National Forest to the southwest, northwest and northeast
- Wenatchee National Forest to the east and southeast, and
- Gifford Pinchot National Forest to the south.

In addition, four U.S. Forest Service wilderness areas (managed by the above forests) share a common boundary with the park:

- Clearwater Wilderness (14,598 acres)
- William O. Douglas Wilderness (166,603 acres)
- Tatoosh Wilderness (15,700 acres)
- Glacier View Wilderness (3,080 acres)

These designated wilderness areas are also called "Congressionally Reserved Areas" under the *Northwest Forest Plan*" (USFS and BLM, 1994).

Most of the bordering non-wilderness forest lands are classified by the USFS as "late successional reserves", which are being managed over the long-term to protect and enhance late successional and old growth forest characteristics, including habitat for the northern spotted owl. Although thinning and silvicultural treatments are allowed in these reserves, they can only occur in stands up to 80 years of age and only if the treatment is determined to be beneficial to the creation and maintenance of late successional forest conditions.

Private lands are located along the park's western boundary in Pierce County. Rainier Timber Company, LLC (formerly International Paper and Champion Pacific Timberlands, Inc.) owns about 120,000 acres of land adjacent to the west park boundary and Plum Creek owns three sections of productive timberland adjacent to the northwest park boundary.

Lands adjacent to Mount Rainier National Park are comprised of private lands (13%), USFS lands (54%) and USFS Wilderness (33%). The perimeter of the parks is 85 miles, with private lands totaling 10.9 miles, USFS Late Successional Reserve and Matrix lands 27.9 miles, and USFS Wilderness 46.2 miles.

C. DESCRIPTION OF ADJACENT LANDS FIRE MANAGEMENT GOALS

A map of the area can be viewed on the linked web site: [Adjacent Lands](#)

- ♦ Mt. Baker-Snoqualmie National Forest to the southwest, northwest and northeast
- ♦ Wenatchee National Forest to the east and southeast, and
- ♦ Gifford Pinchot National Forest to the south.

The US Forest Services area bordering Mount Rainier NP are in the full suppression mode. They have not yet introduced the fire use concept in their wildernesses. They are not willing to accept MORA's fires and would aid in the suppression efforts to prevent a fire from entering their land management responsibilities.

- ♦ Clearwater Wilderness (14,598 acres)
- ♦ William O. Douglas Wilderness (166,603 acres)
- ♦ Tatoosh Wilderness (15,700 acres)
- ♦ Glacier View Wilderness (3,080 acres)

Private lands are located along the park's western boundary in Pierce County. Rainier Timber Company, LLC (formerly International Paper and Champion Pacific Timberlands, Inc.) owns about 120,000 acres of land adjacent to the west park boundary and Plum Creek owns three sections of productive timberland adjacent to the northwest park boundary.

All of the private land owners on the east boundary of MORA are also not willing to accept any type of fire onto their properties. Upon concurrence from the FS or private landholder, all efforts would be made to suppress a wildland fire that would leave the Park.

D. HISTORIC ROLE OF FIRE AT MOUNT RAINIER NATIONAL PARK

1. FIRE ECOLOGY

Maps of the area can be viewed by linking to the web: [Recent Fire History](#)

Fires tend to be infrequent in the forests and meadows of Mount Rainier. However infrequent, fires are by far the most important disturbance factor affecting forests on a wide scale in the park. Hemstrom and Franklin (1982) suggest a natural fire rotation of 465 years for the montane forests, with substantial variance in that figure from century to century. This long rotation period often allows forest succession to proceed to the climax forest condition. Below about 3,000 feet elevation, western hemlock (*Tsuga heterophylla*) is the dominant climax species. Above 3,000 feet elevation, it gives way to Pacific silver fir (*Abies amabilis*). In the mountain hemlock, extending to 6,500 feet, whitebark pine (*Pinus albicaulis*), subalpine fir (*Abies lasiocarpa*) and mountain hemlock (*Tsuga mertensiana*) are the persistent species in these zones.

In the *Western Hemlock Zone*, disturbance by fire kills most of the trees inside the fire boundary. Occasionally, scattered Douglas-fir (*Pseudotsuga menziesii*), markers of an earlier fire, survive. Douglas fir live up to 1000 years, and as an early seral species only reproduce in open conditions. After a fire, it usually dominates early successional stands, but later successional species such as western hemlock [and in the east, grand fir (*Abies grandis*)] are also present. Over centuries, these later successional species will replace Douglas-fir as individual Douglas-fir die; however, total replacement can take 700-1000 years.

Throughout much of the *Pacific Silver Fir Zone*, Douglas-fir shares early successional dominance with noble fir (*Abies procera*) and western white pine (*Pinus monticola*). The ages of these trees are often

used as indicators of a past disturbance. As stands grow older, Pacific silver fir assumes a more important role in the forest overstory and understory.

Successional dynamics at high elevations are difficult to determine. Harsh environments for tree regeneration often result in the conversion of forests to shrub and herbaceous environments for a century or more. The diversity of the landscape in the *Mountain Hemlock Zone* depends on the balance between forest and non-forest vegetation, and how fire affects that balance. Huff and Agee (1991) affirmed the importance of fire in maintaining mountain hemlock meadow ecosystems. Similar studies in the Olympic Mountains (Agee and Smith, 1984) suggest that post-fire forest recovery depend on good seed producing years in adjacent forest and mild, moist summers. Large burn areas remain meadows for over a century. Henderson (1973) shows a great diversity in pioneer communities and community routes, reflecting in part the wide diversity in meadow environments found at Mount Rainier.

In summary, fire has been a factor in plant community development at Mount Rainier for millennia. The character of both western hemlock and mountain hemlock forests reflects the influence of fire, although in some cases the stands have been undisturbed for many centuries. Continuation of the role of fire is essential if the natural diversity and structure of the park forests and meadows are to be maintained for future generations.

2. FIRE HISTORY

Maps of the area can be viewed on these linked web sites:

[Fire Frequency](#)

[Fire Frequency and Forest Age](#)

[Fire Frequency/Natural Fire Rotation](#)

Disturbance of park vegetation by fire is an important natural process that has played a prehistoric and historic role in forming the mosaic of vegetative communities at Mount Rainier National Park. "Natural stand replacement, on (western Cascade slope) forests, almost inevitably results from fire."

In a western hemlock/Douglas-fir forest the natural fire regime is one of infrequent crown and severe surface fires that usually result in total mortality of the trees in the stands (Agee 1981). These disturbances permit the establishment of even-aged classes of early seral stage conifers (Hemstrom and Franklin, 1982). All but a small fraction of the forest area has been affected during the last 1,000 years (Hemstrom and Franklin, 1979). Frequency of prehistoric fires must be determined from vegetation map patterns, aerial photos and fire scar analysis. From research, the natural fire rotation for Mount Rainier has been determined to be approximately 465 years (Franklin *et al.* 1988).

Huff and Agee (1991) state "We found fire to be a major disturbance factor in subalpine forests, similar to other forests..." "It is clear that subalpine fir forests in this region are linked to recurring fire. Many low elevation subalpine meadows and treed meadows would not exist in these areas without fire. The diversity and patchwork of meadows, tree clusters, and forests would be altered without fire. If global warming becomes a reality, fire will likely be a major initiator of new forest development patterns."

The park's fire history shows the largest recent human-caused fire within the park to have been a road clearing fire that escaped and burned 11,000 acres in the 1930s. Ancient fire history (Table 1), however, shows fire episodes (based on tree ring analysis and other factors) of up to 61,750 acres. Excepting that, large fires have been in the range of 2,500 to 11,000 acres, and most fires have been on the order of 1,000 acres or less. Finally, the most frequent fires are much smaller, on the order of 1-5 acres or less.

Early park documents (Allen 1922) also attest to burning of some park landscapes by Native Americans. Allen suggests that Mount Rainier lands were burned by Indian people to make them more accessible and to improve huckleberry and game habitat (*See also Fire History section below*).

Therefore, it is reasonable to assume that unless regional weather patterns precipitated extremely large catastrophic fires (that under any scenario would likely be difficult to contain or control), that the fire management strategies employed in this plan, including Fire Suppression, Wildland Fire Use, and Prescribed Fire, would primarily result in a large number of fires less than 5 acres, some fires up to 2,500 acres, and a few fires between 2,500 and 11,000 acres. The actual size and number of fires would depend on prevailing weather patterns, the location of lightning strikes, and the extent of fire spread before naturally extinguished (via weather conditions or fuel breaks or discontinuities) or suppressed.

Fire frequency varies with topographic position. Age of major fire episodes are shown along different slope aspects. For example, in the Ohanapecosh River valley, north and east facing slopes contain old growth forests of 700+ years. South and west facing slopes have stands 350 years old or less. The White, Cowlitz and Nisqually River drainage's have burned most frequently because of a general southerly aspect and lack of natural barriers to prevent disturbances outside the park from burning into the park (Hemstrom and Franklin, 1982 and Franklin *et al.* 1979).

Historical records from 1850 to 1915 are sketchy. Documentation of this period indicates less than 100 fires that were over 20 acres in size. The largest fires, however, were up to 2,500 acres. Miners, hunters and sheepherders were active in the area and fires were either documented by or attributed to their activities. In 1880, the greatest acreage (2,540 acres) burned from two ignitions. (Report from Chief Ranger's Office, 1953).

Historically, the sources of ignition have been lightning, aboriginal humans and modern humans. To what degree fires in the park had human origins is not yet clear, however one of the most specific references is from Forests of Mount Rainier National Park (G.F. Allen 1922) which contains the following description.

"The old burns in the middle altitudes of the park occupy regions once frequented by the Klickitat Indians. Every summer parties of hunters and berry pickers from the sagebrush plains crossed the Cascades with their horses. They followed the high divides and open summits of the secondary ridges until they came around to the open parks about Mount Rainier where they turned their horses out to graze and made their summer camp. The women picked huckleberries and the men hunted deer and goats. They made great fires to dry their berries and kindled smudges to protect their horses from flies. It was also their custom to systematically set out fires as they returned. Burning made the country better for the Indians. The fires kept down the brush and made it more accessible. Deer could be more easily seen and tracked and the huckleberry patches spread more widely over the hills.

No considerable part of the lower forests of the park has been burned. The principal danger is from lightning. However, few of the trees struck are ignited and these fires are usually extinguished by the rain. . ."

A more recent reference drawn from work that analyzed the Native American fire influence on the surrounding Mount Rainier Forest Reserve (some of which later became part of the park) states that of 32 fires that occurred in 1904-05, 16 were recorded to have been caused by American Indians (Mack 2003). Later the same article states:

What we see here is a pattern of repeated fires set in areas where the tree cover is very light, either within or adjacent to existing larger burns. They were set at a time of year when either rain or snow could be counted on to extinguish them within a month's time. They could certainly be described as maintenance fires.

By only a few years later (1907) Mack (2003) states that only one of 22 fires was of Native American origin.

Native Americans may have set maintenance fires through the early part of the 20th century in old burns in the park and/or the Mount Rainier Forest Reserve (later national forest land) that continued to result in higher production of berry and/or ungulate forage (Allen 1904, Mack 2003) although the connection between increased berry production and increased fire frequency as studied by Minored *et al.* (1979) was inconclusive (Mack 2003). Anglo-Europeans were probably a significant influence in the mid-1800s, setting clearing fires that may have moved into the park. During the twentieth century, Anglo-Europeans have both set and suppressed fires in the park. Lightning has historically been the most important ignition factor, and will probably continue to be so.

The largest single fire in the park's history was 11,000+ acres (1930) at Sunset Park, on the park's west side. The cause was right-of-way burning for construction of the Westside Road (Superintendent's Annual Report, 1931). The most frequent natural fires have been small, less than 1 acre in size; and are ignited on upper slopes. Major fires are typically intense, catastrophic and stand replacing, but of low incidence.

Fire information for the recent ten-year period (1987-1997) shows a Normal Fire Year averaging eight starts. In 1990 there were at least 38 starts, 11 in 1991, and 11 in 1994. During this period, 83 total fires were reported. Of the 83 fires, 37 were lightning fires that were naturally extinguished. From 1930-1985 records, the frequency of human-caused fire accounts for 65 percent of all ignitions. These fires are concentrated near developed areas, allowing early detection and quick suppression. (See map showing locations of fire starts over time)

In the past 10 years, the greatest number of recorded ignitions from lightning strikes for a single storm was 22 (1990); burning 8.4 acres. Records from 1928 to 1953 show 59 percent of recorded lightning fire starts occurred between 4,500 feet and 5,500 feet in elevation (Report from Chief Ranger's Office, 1953).

Historic records show a normal year having few natural fires and many years where none occur at all. Few historic fires consumed over 1,000 acres. This fact is important in fire management implications. Fires are ecologically important even though recorded fire size under suppression response has been small. Therefore, it may be that each natural fire start is highly significant environmental process acting on an ecosystem. As a result if continued suppression of naturally ignited wildland fires occurred, there could be significant changes over time to the successional conditions naturally occurring in the park. The past 100 years of fire suppression has likely already changed what would have been natural vegetation community characteristics in a landscape unaltered by direct fire suppression. To the extent that Native Americans used fire in the park and surrounding areas, these conditions have also likely been altered by fire suppression.

Table 1: Ancient Fire History

(Adapted from Franklin *et al.* 1988 (Table 17): Major fires, their correspondence to period of drought, and the present and reconstructed original extent of resulting seral forests at Mount Rainier National Park (after Hemstrom and Franklin 1982).

Episode date (A.D.)	Present Forested Area		Reconstructed Forested Area		Drought Period
	Acres	Percent of Total	Acres	Percent of Total	
1230	15475	12	61750	47	
1303	35802	3	14820	11	1290-95 ²
1403	17068	13	33839	26	1406-13 ²
1503	11609	9	33790	26	1477-90 ²
1628	5198	21	31863	24	1627-33 ²
1688	2964	2	10893	8	1986 ³
1703	6669	5	12696	10	1700 ³
1803	5508	4	5508	4	1801 ³
1825	5928	5	6126	5	1826-26 ³
1856	1210	1	6916	5	1856 ³
1858	7509	6	9139	7	1856 ³
1872	1482	1	1482	1	1869-73 ²
1886	9386	7	10572	8	1888 ³
1934	1902	1	1902	1	1917-36 ²

¹No climatic reconstruction available for dates before 1250 A.D.

²Keen (1937) first- or second-magnitude drought.

³Blasing and Fritts (1976) abnormally dry winter.

Ancient fire history maps of the area can be viewed on these linked web sites:

[~1228](#)

[~1303](#)

[~1403](#)

[~1503](#)

[~1628](#)

[~1703](#)

[~1803](#)

[Since 1820](#)

Table 2: Recent Fire History

(Adapted from Franklin *et al.* 1988 (Table 17): Major fires, their correspondence to period of drought, and the present and reconstructed original extent of resulting seral forests at Mount Rainier National Park (after Hemstrom and Franklin 1982).

Episode Date A.D.	Present Forested Area		Reconstructed Forest Area		Drought Period
	Acres	Percent of Total	Acres	Percent of Total	
1931 (3)	Unknown	< 1	Unknown	< 1	Unknown
1932 (4)	Unknown	< 1	Unknown	< 1	Unknown
1933 (8)	Unknown	< 1	Unknown	< 1	Unknown
1934 (6)	Unknown	< 1	Unknown	< 1	Unknown
1935 (2)	Unknown	< 1	Unknown	< 1	Unknown
1936 (4)	Unknown	< 1	Unknown	< 1	Unknown
1937 (9)	Unknown	< 1	Unknown	< 1	Unknown
1938 (5)	Unknown	< 1	Unknown	< 1	Unknown
1939 (4)	Unknown	< 1	Unknown	< 1	Unknown
1940 (7)	Unknown	< 1	Unknown	< 1	Unknown
1941 (22)	Unknown	< 1	Unknown	< 1	Unknown
1942 (4)	Unknown	< 1	Unknown	< 1	Unknown
1943 (2)	Unknown	< 1	Unknown	< 1	Unknown
1945 (3)	Unknown	< 1	Unknown	< 1	Unknown
1946 (7)	Unknown	< 1	Unknown	< 1	Unknown
1947 (1)	Unknown	< 1	Unknown	< 1	Unknown
1948 (2)	Unknown	< 1	Unknown	< 1	Unknown
1949 (11)	Unknown	< 1	Unknown	< 1	Unknown
1950 (4)	Unknown	< 1	Unknown	< 1	Unknown
1951 (7)	Unknown	< 1	Unknown	< 1	Unknown
1952 (1)	Unknown	< 1	Unknown	< 1	Unknown
1953 (1)	Unknown	< 1	Unknown	< 1	Unknown
1956 (4)	Unknown	< 1	Unknown	< 1	Unknown
1958 (4)	Unknown	< 1	Unknown	< 1	Unknown
1959 (1)	Unknown	< 1	Unknown	< 1	Unknown
1960 (2)	Unknown	< 1	Unknown	< 1	Unknown
1963 (10)	Unknown	< 1	Unknown	< 1	Unknown
1965 (7)	Unknown	< 1	Unknown	< 1	Unknown
1966 (1)	Unknown	< 1	Unknown	< 1	Unknown
1967 (2)	Unknown	< 1	Unknown	< 1	Unknown
1970 (1)	Unknown	< 1	Unknown	< 1	Unknown
1977 (17)	Unknown	< 1	Unknown	< 1	Unknown
1979 (4)	Unknown	< 1	Unknown	< 1	Unknown
1981 (1)	Unknown	< 1	Unknown	< 1	Unknown
1982 (12)	Unknown	< 1	Unknown	< 1	Unknown
1983 (1)	Unknown	< 1	Unknown	< 1	Unknown
1984 (1)	Unknown	< 1	Unknown	< 1	Unknown
1985 (4)	Unknown	< 1	Unknown	< 1	Unknown
1986 (3)	Unknown	< 1	Unknown	< 1	Unknown
1987 (4)	Unknown	< 1	Unknown	< 1	Unknown
1988 (2)	Unknown	< 1	Unknown	< 1	Unknown
1989 (5)	Unknown	< 1	Unknown	< 1	Unknown

Table 2: Recent Fire History

Episode Date A.D.	Present Forested Area		Reconstructed Forest Area		Drought Period
	Acres	Percent of Total	Acres	Percent of Total	
1990 (38)	Unknown	< 1	Unknown	< 1	Unknown
1991 (11)	Unknown	< 1	Unknown	< 1	Unknown
1992 (8)	Unknown	< 1	Unknown	< 1	Unknown
1993 (1)	Unknown	< 1	Unknown	< 1	Unknown
1994 (13)	1.3	< 1	Unknown	< 1	Unknown
1994	Unknown	< 1	Unknown	< 1	Unknown
1995	Unknown	< 1	Unknown	< 1	Unknown
1997 (4)	0.8	< 1	Unknown	< 1	Unknown
1998 (7)	Unknown	< 1	Unknown	< 1	Unknown
1999 (4)	Unknown	< 1	Unknown	< 1	Unknown
2000 (3)	0.3	< 1	Unknown	< 1	Unknown
2001 (5)	0.5	< 1	Unknown	< 1	Unknown
2002 (8)	13.0	< 1	Unknown	< 1	Unknown
2003 (11)	391.6	< 1	Unknown	< 1	Unknown
2004 (?)	Unknown	< 1	Unknown	< 1	Unknown

3. FIRE WEATHER HISTORY

The weather of the area is significant to fire management. Low lightning activity and significant rain have produced an ecosystem with a low fire incidence and a long fire cycle. Contributing to this phenomenon is high relative humidity and general low wind velocity, which helps keep fuel moisture high and the fire season short, typically from mid-June until mid-September.

Annual precipitation is high, ranging from about 60 inches at low elevations to over 100 inches at subalpine levels. Most winter precipitation is in the form of snow, accumulating in snow packs of 20 or more feet in depth. Paradise total annual average snowfall is approximately 675 inches or 56.5 feet. In the record year (1977-78), 1,122 inches or 93.5 feet of snow occurred. As a result, snow often remains on the ground until June or July at Paradise and sometimes does not dissipate entirely over the summer in other parts of the park (e.g., Cayuse Pass). In another example from early August 1999 Paradise still had a significant amount of snow on the ground. Winter storm winds are from the west and southwest forming a rain shadow on the eastern and northeastern sides of the park. Fog, wind, snow or rain may occur any day of the year.

Climate

The climate of Mount Rainier National Park exhibits climatic characteristics affected by both topography and its location on the west slope of the Cascades. Moderately cold winters with deep snow accumulations are often followed by mild, dry summers. Park weather is often dramatically different from that in the surrounding lowlands. Low lightning activity and significant amounts of rainfall have produced an ecosystem with a low fire incidence and a long fire cycle.

Annual precipitation is high, as discussed earlier. In late summer and fall, strong dry north to east winds may produce extreme fire dangers. Two weather types produce this fire behavior. One is a cold-front passage followed by a bulge of the Pacific High extending inland over the coast.

Northeasterly winds blowing down slope produce a warming and drying foehn wind. The second type follows when higher pressure develops east of the Cascades while a trough lies off the coast, resulting in dry easterly winds causing high fire danger on the west slopes of the Cascades. Airflow keeps the marine air offshore and results in adiabatic warming as the air flows from higher elevations down to sea level.

Precipitation

Orographic lifting on the western slopes of the Cascades from an influx of moist air from the Pacific Ocean results in some of the highest precipitation levels in North America, ranging from 60" at low elevations to over 100" at subalpine levels. Paradise, at 5,400 feet averages 126 inches of precipitation, with the total average snowfall at 682.3 inches, average snow depth of 80 inches and highest recorded snowfall at 1,122 inches in 1972 (a former world record bested by Mount Baker in 1998-1999). Longmire, at 2,761 feet averages 87 inches of rain per year and Ohanapecosh at 1,900 feet averages 75 inches. The driest areas in the park are on the east side of the mountain and are caused by the rain shadow effect wherein system lifting and cooling causes most of the precipitation to fall on the west side of the mountain as systems track from the west to the east. The summer-dominant Pacific high has a significant effect on regional fire weather and contributes to dry summer months with extended periods (often up to six weeks) of no precipitation. Mount Rainier National Park is in the North Pacific Coast fire climate region.

Temperature

The average maximum temperature for the warmest month, August, is 61.5 degrees Fahrenheit at Paradise. At Longmire, the average high temperature is in July at 75 degrees F and at Ohanapecosh in August at 81 degrees F. The average minimum temperature at Paradise is 20.3 degrees F in January. The average lows for Longmire and Ohanapecosh during the months of June through September is about 45 degrees F. Ambient temperatures are commensurate with environmental lapse rates, where temperature decreases proportionally with elevation.

Relative Humidity

Clouds often obscure Mount Rainier. The lower elevations are often cushioned by low level cloudiness. Occasionally, however, inversions will produce moist fog layers in low lying river valleys and forests below the park, while elevations from the subalpine on up will be bathed in sunshine. A similar occurrence occurs with some coastal fogs occurring during the summer which do not quite reach the west side of the park, often leaving the park in sunshine, while lower Puget Sound communities, often including Eatonville shrouded in fog.

4. FIRE SEASON

The normal fire season, derived from FIREPRO analysis, is June 21 through September 10, although lightning storms may extend from late May to late September. Major fires have occurred during prolonged drought (Franklin et al., 1979). The number of consecutive days without rainfall during the fire season, and the number of years with less than average precipitation, are important in determining fire frequency. Weather records from Longmire show a cycle of 4.2 peak wet years and 4.1 dry years. This cycle correlates to fire activity within the park (report from Chief Ranger's Office, 1953).

Lightning storms are generally infrequent in the vicinity of Mount Rainier. In the past 67 years (1930-1997), only 234 lightning ignitions have been recorded (Mount Rainier Fire Atlas 1930-1979, and 1980, FIREPRO 1979-1997). There were 22 lightning ignitions in 1990. Summer lightning storms most commonly come from the south or southeast. Typically, light to heavy rain occurs during and after storms, restricting the spread of ignitions. However, smoldering fires can spread if the lightning storm is followed by dry, warm days, especially in conjunction with east winds.

Conditions to be concerned about within the Park include, periods of mild snow accumulation or snowfall or rainfall (long and short term drought conditions) combined with a warmer than usual

summer, lightning strike weather conditions, and an east wind pattern.

Conditions to be concerned about within the park include:

- periods of mild snow accumulation;
- snowfall or rainfall (including both long and short term drought conditions) combined with a warmer than usual summer;
- lightning strike weather conditions;
- east wind patterns;
- large outbreaks of forest disease or insect infestations;
- large areas of wind-thrown timber; or
- large areas of ice damaged trees.

5. FIRE BEHAVIOR

The behavior of naturally occurring wildfires in Mount Rainier National Park is not well documented primarily because the interval between fires is great. In addition, documentation of fire behavior is a relatively recent strategy. Fire behavior is not uniform and may vary substantially from site to site as a function of weather, fuels, and topography. With a cool, moist environment, the park ecosystems are not conducive to frequent fire. As a result, there are few fires in modern times from which careful observations have been recorded. Fire behavior can be predicted from a variety of sources, including BEHAVE fire prediction software.

The best source of fire behavior information is Hemstrom and Franklin's (1982) "*Fire and other disturbances of the forests in Mount Rainier National Park*." Several fire behavior implications can be drawn from this largely ecologically based study. The first is that although fires tend to be infrequent they are usually of high severity (i.e., they kill most of the trees within the fire perimeter). This suggests that they are of moderate to high fire line intensity (rate of heat release). Many of the fires of the distant past are part of what Hemstrom and Franklin call "fire episodes", or one or more individual fire events occurring so close in time that they cannot be separated using the typical reconstruction method of forest age class analysis. These fire episodes suggest two important characteristics of fires in the park: (1) the episodes can cover large areas with multiple fires, and (2) these large fires either burned from inside the park to areas outside, or vice versa.

The techniques employed by Hemstrom and Franklin resulted in the "fire episode" being the primary focus of their study. Fires smaller than 250 ha (just over 615 acres) were largely ignored. However, smaller fires have occurred in the past, will continue to occur, and will continue to have a significant cumulative effect on ecosystems of the park.

Historically, the sources of ignition have been lightning, aboriginal humans and modern humans. Although there is no evidence that aboriginal humans were a major source of ignition, the Native American influence has never been quantified. Anglo-Europeans were probably a significant influence in the mid-1800s, setting clearing fires that may have moved into the park. During the twentieth century, Anglo-Europeans have both set and suppressed fires in the park. Lightning has historically been the most important ignition factor, and will probably continue to be so.

General factors affecting fire behavior include fuel moisture, wind, heat transfer methods (radiation, conduction and convection), and fuel type and arrangement. Conditions, which allow a lightning-set fire to grow to substantial size, have not been studied in the park to any extent. However, a study at Olympic National Park suggests that four factors are associated with fires exceeding 1 ha (2.47 acres) in size:

- 1) long-term drought (exceeding several months),
- 2) short-term drought (weeks),
- 3) ignition (lightning), and
- 4) occurrence of an east wind pattern (associated with low humidity and high wind velocity) before

significant precipitation falls. Such winds are most likely to blow from directions ranging from north to southeast.

The same regional patterns probably affect fires at Mount Rainier. Therefore, critical fire weather would tend to encourage fire in the northeast quadrant of the park to spread primarily into the park. On the southeast quadrant, valley winds might offset gradient winds at times, so that both up and down slope and up and down valley spread is likely. On the western half of the park, valley winds will typically be moving perpendicular to gradient winds, so that up and down slope spread will dominate over up and down valley fire spread (assuming that gradient winds are greater than valley winds or topographic effects).

Seasonal occurrence of fires will probably focus on June-September for montane zones and July-September for subalpine zones. Because of fuel lack of continuity, subalpine fires will generally be smaller than those in the montane zones will. Fires may be expected under unusual conditions outside of these periods. For example, in 1987, three subalpine fires occurred while snow was still on the ground in early May. This was attributed to the effects of very warm weather causing crown moisture stress in trees whose roots were in frozen soil and would not allow moisture transmission to replenish water lost from the crowns. In addition, there was a significant component of lichens in the crown that quickly responded to the low relative humidity and high ambient temperatures, becoming a very dry fine fuel bed. A lightning storm passed through and ignited the tree crowns. This type of fire, depending on location, could potentially spread into facilities and would be difficult for fire suppression crews to control.

Fires moving uphill tend to move faster due to the flames moving up and preheating the fuel ahead through convection. With less effective combustion due to heavy branches, water vapor of fuel loads, decreased consumption of organic matter may occur, resulting in a greater patchiness of fire effects in steep terrain.

Range of Potential Fire Behavior

A wide range of potential fire behavior has occurred within the park. Fires include slow or fast moving meadow fires, creeping duff fires, and rapidly moving, crowning fires with greater intensity, higher flame lengths and increased consumption of ground fuels. These types of fire behavior may all occur in the same fire event.

Historic weather data from the Ohanapecosh and Longmire weather stations was used to evaluate potential fire behavior. At Ohanapecosh, winds are generally out of the south and southwest with maximum-recorded wind speeds of 18 miles per hour. At Longmire, winds are out of the southeast and south with maximum-recorded wind speeds also of 18 miles per hour. The wind direction for the Longmire station likely reflects the prominent down canyon winds that occur in the afternoon at the time weather is taken. Fire behavior was calculated with BEHAVE, using weather conditions from the Ohanapecosh station. Fires typically smolder or burn slowly in moist fuels with many fires burning out before they reach 0.1 acre in size. Under moderate to high fire weather conditions, fires can burn rapidly (600 feet/hour) up south and southwest facing slopes where there is heavy fuel on the ground or in dry meadows. In much of the forest, where the surface fuels are relatively sparse, fire will burn slowly uphill, burning up to 200 feet in an hour. Under extreme conditions, crown fires, with spotting up to 0.5 mile ahead of the fire and spread faster than 0.25 miles in an hour are possible in areas with heavy fuels. Such extreme conditions, however, rarely occur in the park. On north and northeast slopes, fire will be relatively inactive due to shading, cool temperatures, and higher fuel moistures.

- Historically annual fire activity is infrequent and small in size, although recent human-caused fires in excess of 11,000 acres have occurred and the ancient fire history shows fires of more than 60,000 acres.
- Although infrequent, high intensity fires usually exhibit high severity, killing most of the trees within the fire boundary. Such fires are potentially extremely dangerous to monitoring or suppression personnel.

- Situations indicative of potentially severe fire activity (recent drought years, drought during current season, wildland fire ignitions with east winds and little precipitation) have been correlated with large fire incidence and will be monitored.
- Effects of the global warming theory on the natural fire cycle are unknown, but warrant consideration. Increased temperatures and reduced precipitation could accelerate the fire cycle and lead to more frequent and intense fire activity.

E. FUEL MODEL TYPES

A map of this area can be viewed by web link to: [Fire Fuel Model](#)

[Forest Habitat Overstory](#)

[Forest Habitat Understory](#)

Classifications of Franklin and Dyrness (1969) identify four vegetation communities presented by Franklin and Bishop (1969) for Mount Rainier National Park. See *The Forest Communities of Mount Rainier National Park* (Franklin *et al.* 1988) for a more complete discussion.

1. Western Hemlock (*Tsuga heterophylla*) Zone

This zone is characterized by stands of Douglas-fir (*Pseudotsuga menziesii*), western hemlock and western red cedar (*Thuja plicata*). Some of these stands are composed of trees that tower 250 feet or more and can measure 80-100 inches in diameter at breast height. Other typical species are Pacific yew (*Taxus brevifolia*) and vine maple (*Acer circinatum*).

Understory species include Oregon grape (*Berberis nervosa*), salal (*Gaultheria shallon*), and red huckleberry (*Vaccinium parvifolium*), blackberry (*Rubus ursinus*), twin flower (*Linnaea borealis* var. *longiflora*), trillium (*Trillium ovatum*), and western sword fern (*Polystichum munitum*).

Red alder (*Alnus rubra*), bigleaf maple (*Acer macrophyllum*) and grand fir (*Abies grandis*) are common along streams. A lush growth of lady fern (*Athyrium filix-femina*), devil's club (*Oplopanax horridum*) and deer fern (*Struthiopteris spicant*) also characterize moist sites.

This zone exists at lower elevations outside the park and extends into the park to about 2,800 feet in elevation. In the Sunrise Ridge area, on the northeastern slopes of the mountain, this zone extends to 3,800 feet.

Common Fuel Models Present

Fuel Model System		Description	Generalized Fire Behavior for NFFL Fuel Models
NFDRS #	NFFL #		
G		Dense conifer stands with heavy accumulations of litter and downed woody material	
	8	Closed timber litter	Slow-burning ground fires, with low flame lengths, can exhibit some flare-ups in heavy down fuels. Fuels pose fire hazards under severe weather conditions
	10	Timber, with heavy accumulation of downed material, duff and litter	Fire burns on the ground with higher intensities than the other timber fuel models. Due to the higher quantities of larger fuels, crowning out, spotting and torching of individual trees is more frequent creating control problems.

2. Pacific Silver Fir (*Abies amabilis*) Zone

This zone is the most extensive forested zone in the park. The most common species are Pacific silver fir, noble fir (*Abies procera*), western white pine (*Pinus monticola*), western hemlock and Douglas-fir. Engelmann spruce (*Picea engelmannii*) is found on the lower slopes and in the valleys of the White River drainage.

Typical understory plants include huckleberry species (*Vaccinium spp.*), bunchberry dogwood (*Cornus canadensis*), single-flowered clintonia (*Clintonia uniflora*), beargrass (*Xerophyllum tenax*), vanilla-leaf (*Achlys triphylla*), prince's pine (*Chimaphila umbellata*), twin flower, Oregon grape, and the moss *Rhytidiopsis robusta*.

This zone's elevation ranges from about 2,800-4,500 feet and about 3,800-5,500 feet on the northeastern slopes of the mountain. Annual precipitation can range up to or over 100 inches, mostly falling as snow.

3. Mountain Hemlock (*Tsuga mertensiana*) Zone

Above 4,500 feet, mountain hemlock becomes the forest dominant species. Other typical tree species are Pacific silver fir, subalpine fir (*Abies lasiocarpa*), Alaska cedar (*Chamaecyparis nootkatenis*), white bark pine (*Pinus albicaulis*) and Engelmann spruce.

This zone can be divided into two segments; a lower sub-zone of continuous closed forest and an upper sub-zone, which is a mosaic of forest patches, tree groups and subalpine meadows.

Understory forest species include beargrass, huckleberry, avalanche lily (*Erythronium montanum*), dwarf bramble (*Rubus lasiococcus*), Sitka valerian (*Valeriana sitchensis*) and broad-leaved arnica (*Arnica latifolia*).

Some of the more common meadow plants are avalanche lily, glacier lily (*Erythronium grandiflorum*), western anemone (*Anemone occidentalis*), red heather (*Phyllodoce empertriformis*), white heather (*Cassiope mertensiana*), mountain phlox (*Phlox diffusa*), lupines (*Lupinus spp.*), bistort (*Polygonum bistortoides*), cinquefoil (*Potentilla flabellifolia*) and louseworts (*Pedicularis spp.*).

This zone's elevation range extends from about 4,500-6,200 feet. Precipitation is primarily in the form of snow.

Common Fuel Models Present

Fuel Model System		Description	Generalized Fire Behavior for NFFL Fuel Models
NFDRS #	NFFL #		
G		Dense conifer stands with heavy accumulations of litter and downed woody material	
H		Stands of short needled conifers, sparse undergrowth and thin layer of ground fuels	
	1	Short grass	Fire moves rapidly through cured grass and forbs
	3	Tall grass	High rates of spread, especially under the influence of wind or topography, most intense fires of the grass fuel types
	5	Brush approx. 2 feet tall	Fires generally not very intense, due to light surface fuel loading
	8	Closed timber litter	Slow-burning ground fires, with low flame lengths, can exhibit some flare-ups in heavy down fuels. Fuels pose fire hazards under severe weather conditions
	10	Timber, with heavy accumulation of downed material, duff and litter	Fire burn on the ground with higher intensities than the other timber fuel models. Due to the higher quantities of larger fuels, crowning out, spotting and torching of individual trees is more frequent creating control problems.

4. Subalpine Fir (*Abies lasiocarpa*) Zone

This zone is characterized by rugged mountainous terrain above 4,600 feet and is defined subjectively at the upper limits as the treeline and at the lower limit as the extent of the closed-canopy forests. Subalpine meadows are perhaps the most striking feature of this zone. The Cascade Range in Washington supports subalpine meadows that span elevation gradients larger than any other mountain range in North America (Franklin and Dyrness 1973).

The two main tree species are mountain hemlock (*Tsuga mertensiana*), found in cold, moist locations, and subalpine fir (*Abies lasiocarpa*), found in cold, dry locations in the zone. Other forest tree species include Engelmann spruce (*Picea engelmannii*), Pacific Silver fir (*Abies amabilis*), and Alaska yellow-cedar (*Chamaecyparis nootkatensis*). Commonly associated shrub species are big huckleberry (*Vaccinium membranaceum*), *V. deliciosum* and *V. scoparium*.

Fuel Model System		Description	Generalized Fire Behavior for NFFL Fuel Models
NFDRS #	NFFL #		
G		Dense conifer stands with heavy accumulations of litter and downed woody material	
H		Stands of short needled conifers, sparse undergrowth and thin layer of ground fuels	
	1	Short grass	Fire moves rapidly through cured grass and forbs
	3	Tall grass	High rates of spread, especially under the influence of wind or topography, most intense fires of the grass fuel types
	5	Brush approx. 2 feet tall	Fires generally not very intense, due to light surface fuel loading
	8	Closed timber litter	Slow-burning ground fires, with low flame lengths, can exhibit some flare-ups in heavy down fuels. Fuels pose fire hazards under severe weather conditions
	10	Timber, with heavy accumulation of downed material, duff and litter	Fire burn on the ground with higher intensities than the other timber fuel models. Due to the higher quantities of larger fuels, crowning out, spotting and torching of individual trees is more frequent creating control problems.

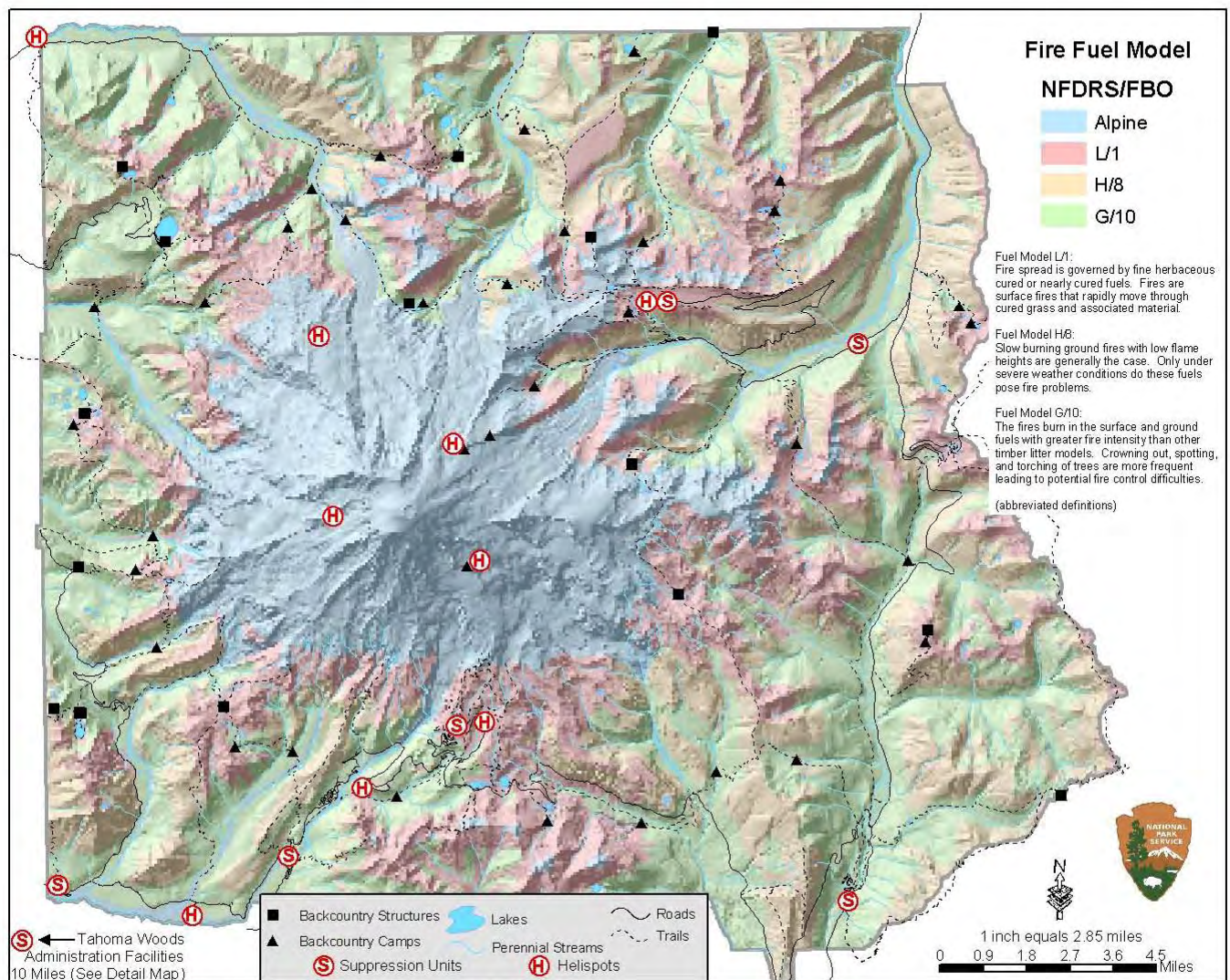
5. Alpine Zone

This park-like sub-zone of the subalpine zone grades gradually into the alpine zone. This zone is basically treeless except for Krummholz. Climate is extreme and fires rare.

Vascular plants are found between 6,000 and 11,000 feet, though glaciers, snowfields and rock surround the infrequent few occurring above 7,500 feet. Most plant species are like those of the lower subalpine meadows. Others include mountain buckwheat (Eriogonum pyrolaefolium), pussy paws (Spraguea umbellata), moss campion (Silene acaulis) and several species of grasses, sedges and rushes.

Some meadows, especially those facing S, SW or SE have been formed from prehistoric fires. Other meadows, mostly composed of heather, were formed, and remain fairly constant, due to snowpack.

Fuel Model System		Description	Generalized Fire Behavior for NFFL Fuel Models
NFDRS #	NFFL #		
	1	Short grass	Fire moves rapidly through cured grass and forbs



Mount Rainier National Park - Fire Management Plan

FIRE FUEL MODEL

F. CULTURAL RESOURCES

1. Prehistoric and Historic Archeology

Only a small percentage of the park has been surveyed for archeological resources. As of the 2002 field season, the park had documented 40 prehistoric and multi-component (prehistoric and historic) sites, 29 prehistoric isolated finds, and 31 historic sites and isolated finds. Most documented archeological sites (74 percent) are found within subalpine communities, with approximately 16 percent in alpine habitats. The rest (10 percent) have been found in forested habitats, where more continuous vegetative cover and deposition, makes it difficult to detect archeological remains. Of these, 75 percent of sites are found on slopes of 5 degrees or less and 75 percent are within 300 feet of water. Archeological modeling predicts the greatest intensity of prehistoric use in subalpine communities and in the upper forest margins that would have supported similar communities as recently as the last "Little Ice Age" approximately 500-150 years ago.

The oldest confirmed dated deposits come from an estimated 3,500 years before the present. Other preserved stratigraphically dated profiles, indicate buried soil to 8,500 years ago. It is likely that the archeological record in the park will be extended to that period. Very early sites are difficult to locate, owing to burial 3-5 feet below the surface.

Prehistoric archeological evidence is dominated by low to moderate-density lithic scatters, most of which are exposed on the soil surface. Dominant materials are cryptocrystalline silicate rock, most of which originated outside the park. Because of the volcano's depositional history, a relatively small fraction of the total remainder of artifacts anticipated is found on the surface. As a result, most of the material is found under the surface, providing some protection from direct fire effects, but not from firefighting effects. Historic artifacts are more likely to contain wood components and would be the most vulnerable to fire.

The most intensive survey efforts have been associated with rehabilitation and construction related projects in the developed areas of the park (including trails and backcountry camps) during the last ten years. Less intensive reconnaissance efforts have focused on subalpine and alpine landscapes, and several forest settings. Other survey efforts have concentrated in areas where known archeological resources have been reported. Understanding of the park's prehistoric use patterns is based on the results of these surveys, on the archeological record in the vicinity of the park, and on environmentally-based models of human subsistence and settlement patterns in mountainous environments (Burtchard 1998). Knowledge of the historical archeological record also relies on these sources, plus written records, informant accounts and historic documents.

Fires would likely have greater impacts on historic archeological resources than on prehistoric archeological resources, due to the subsurface context of the greatest percentage of the latter and the wood content of the former. Because a relatively high percentage of the park's prehistoric archeological record is found in a subsurface context, heat damage from fires is not expected to be as great as occurs elsewhere in environments with lower natural deposition.

2. Historic Structures

There are approximately 167 historic resources in the park individually and collectively listed on the National Register of Historic Places. Many more sites, structures and objects are potentially eligible for the National Register. Prior to designation of the Mount Rainier National Historic Landmark District, as described below, six historic districts were designated in the park for their rustic architectural significance. These include:

- Nisqually Entrance Historic District
- Longmire Historic District
- Paradise Historic District
- Camp Muir Historic District

- White River Entrance Historic District
- Sunrise Developed Area Historic District

Each of these historic districts exhibits significant examples of NPS rustic architecture in the style of the period of its development. In addition, there are 5 National Historic Landmark buildings or building complexes that have been designated in the park. These represent the best designs of the period and, in many cases, were used as models in other National Parks for similar structures. They include:

- Longmire Community Building,
- Longmire Administration Building,
- Longmire Service Station,
- Paradise Inn, and the
- Sunrise Blockhouses/Stockade Complex.

3. Cultural Landscapes/Mount Rainier National Historic Landmark District (NHLD)

The Mount Rainier National Historic Landmark District was designated in 1997. This large and exceptional District, now on the National Register of Historic Places (under landscape architecture), contains 107 historic buildings and 60 historic structures (including most of the park's road system and the Wonderland and Northern Loop trails) as well as 31 other listed features. Together, these resources are considered to be the best example of park master planning in the National Park System. Collectively, they represent an important stage in National Park development history. At Mount Rainier in the 1920s and 1930s, the NPS Landscape Planning Division invented and defined modern National Park planning. Consequently, the Master Plan for Mount Rainier, completed in 1929, was the first National Park master plan developed by the NPS and it was and is considered a model of NPS planning. The degree of conformance to the plan still present in the park is outstanding. As a whole, no other collection of park roads, bridges, developed areas and trails is more completely preserved as an intact example of National Park planning and design of the period (1904-1957). The goal, then as now, was to integrate all park systems and facilities in a unified plan that would ensure the best possible visitor experience while severely limiting how much development would be permitted in the park (Carr 1998). The master plan was executed in the rustic naturalistic style of architecture, using native materials and natural forms to blend constructed works with their environment.

The designation of a NHLD recognizes that the park does not simply contain individual historic resources, but is itself a historical park. The historic roads, trails, buildings and designed landscapes of the park together comprise a cultural landscape of national significance in American history. The significance of the NHLD is divided into the following size categories, which recognize contributing resources:

- Spatial organization – the composition and sequence of outdoor spaces within the district;
- Circulation – the means and patterns of movement through the district;
- Topography – the ways in which the landscape planning responds to the topographic features of the site and the modifications of that topography;
- Vegetation – the response of existing vegetation as well as the management of vegetation through pruning, removal or addition of trees and shrubs;
- Structures – all contributing structures, including roads, trails and other small scale features such as rock walls and culverts; and
- Buildings – structures intended to shelter a human activity.

Approximately one-third of the park's cultural landscapes have had Level I or Level II Cultural Landscape Inventories completed (i.e. 10 of 29). Another approximately 20 Cultural Landscape Inventories and 25 Cultural Landscape Reports are needed to document known cultural landscapes. Even so, there is a great deal of known information that has not yet been documented through these formal inventory processes. Three Cultural Landscape Reports and three Development Concept

Plans also document rehabilitation treatment for 6 cultural landscapes. These would also provide information about vegetation management issues with respect to potential fire effects.

4. Ethnography

Ethnographic resources are defined as landscapes, sites, structures, objects or natural resource features that have significance based on importance attached to them by members of a socio-cultural group associated with the park. At Mount Rainier, these resources are most closely associated with at least six contemporary Native American tribes – Nisqually, Muckleshoot, Puyallup, Yakama, Squaxin Island and Cowlitz.

Based on several investigations, into the archeology, history and ethnography of Mount Rainier National Park (Thompson 1981, Catton 1996, Carr 1997, Boxberger 1998, Smith 1964, Burtchard 1998), no specific Native American use of the park has been documented to date. For thousands of years, however, Mount Rainier has been an important place and a symbolic landmark for the Native Americans. In addition to ancestral use for hunting, archeological and ethnographic evidence suggests that prehistoric people used high elevation landscapes on Mount Rainier to gather a variety of economically important resources. Among other products, gathering beargrass and cedar splits for basketry and collecting plants for medicinal, ceremonial and religious uses has been documented through 1950 (Boxberger 1998). Similar uses continue through the present.

In the park's human history it is likely that Native Americans used fire to some advantage in increasing the yield of harvestable plants well adapted to fire. Native Americans are thought to have intentionally burned upper elevation forest and subalpine areas in the Cascades and other northwest mountainous areas to improve huckleberry productivity and ungulate forage. One of the most specific references is from Forests of Mount Rainier National Park (G.F. Allen 1916 and 1922), which contains the following description.

"The old burns in the middle altitudes of the park occupy regions once frequented by the Klickitat Indians. Every summer parties of hunters and berry pickers from the sagebrush plains crossed the Cascades with their horses. They followed the high divides and open summits of the secondary ridges until they came around to the open parks about Mount Rainier where they turned their horses out to graze and made their summer camp. The women picked huckleberries and the men hunted deer and goats. They made great fires to dry their berries and kindled smudges to protect their horses from flies. It was also their custom to systematically set out fires as they returned. Burning made the country better for the Indians. The fires kept down the brush and made it more accessible. Deer could be more easily seen and tracked and the huckleberry patches spread more widely over the hills.

No considerable part of the lower forests of the park has been burned. The principal danger is from lightning. However, few of the trees struck are ignited and these fires are usually extinguished by the rain. . ."

Over time, changes in the size, seasonally and frequency of fires have occurred as a result of human intervention, including by Native Americans. Interpretation of the extent and ecological impacts of these activities vary widely. Lightning has historically been the most important ignition factor, and will probably continue to be so.

Native American use of the park continues to this day, with some tribes possessing or negotiating agreements for the collection of specified quantities of native plants to continue cultural traditions. It is possible, perhaps probable, that significant, but undocumented, archeological and ethnographic resources, including ceremonial locations exist throughout the park in areas used by the current Native American Tribes and historic use by ancestors of these peoples. Other, less known use for ceremonial or spiritual purposes also occurs but has not been well documented.

Ongoing consultation with Native American Tribes regarding potential prescribed fire plans, as they are developed would ensure that the plans would reflect concerns of both the park and the tribes.

G. WILDERNESS

In 1988, Congress designated approximately 97 percent (228,480 acres) of Mount Rainier National Park as wilderness. Park wilderness includes a wide array of undisturbed lands encompassing ancient rainforest, pristine rivers and brilliant subalpine meadows. Park wilderness values include natural, ecological, geological, cultural, scenic, scientific and recreational opportunities. Natural quiet and natural darkness are also considered wilderness values. In the park, the wilderness boundary generally is located 200 feet on either side of the centerline of paved roads and 100 feet from the centerline of unpaved roads. In addition, the wilderness boundary skirts developed areas by about 200 feet.

Park wilderness offers a wide array of scenic, natural and ecological values. Park wilderness encompasses the full breadth of the diverse Mount Rainier landscape of glacial ice and snow, old growth forests, river headwaters, streams and waterfalls, abundant wetlands and through flower-filled subalpine meadows and rock scree slopes with perennial snow patches. Park wilderness is and has been an ongoing object of scientific study. As the highest active Cascade volcano, exhibiting near-record snowfall and the greatest single-peak glacial system in the continental United States, the Mountain offers outstanding opportunities to understand vegetation, wildlife, fire ecology, catastrophic geologic events – including lahars, glacial outburst floods and volcanic eruptions – snow, ice and other water resources. These resources afford excellent opportunities to study ecosystem structure, function, processes and components across the breadth of this volcanic landscape.

Park wilderness also offers a range of recreational experiences – including camping, hiking, mountain climbing, backpacking, photography, picnicking, and a host of winter activities, including snowshoeing, cross-country skiing, sliding and snowboarding. There remain, despite heavy seasonal visitation, outstanding opportunities for solitude.

Most wilderness use occurs from June through September. During other months (including the winter) and summer weekdays (except during August) few people, are encountered in the vast majority of the wilderness area (NPS 2001).

A map of the area can be viewed on the linked web site: [Existing Conditions \(Wilderness\)](#)

IV. SCOPE OF WILDLAND FIRE MANAGEMENT PROGRAM

A. FIRE MANAGEMENT GOALS AND OBJECTIVES

1. **Ensure that firefighter and public safety is the first priority in every fire management activity.**

Initial Objectives:

- At all times, fire personnel will comply with National Wildfire Coordinating Group (NWCG) guidelines, agency fitness standards and wear personal protective equipment appropriate to their assignment.
- Ensure all fire management activities sustain no injuries to the public and limit the number of annual injuries to fire personnel to no more than 10% of the past five-year average.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* - page 21, Guiding Principle #1; *Management Policies 2001* - Sections 4.5 Fire Management, 8.2.5.1 Visitor Safety, 9.1.8 Fire suppression; *Director's Order #18: Wildland Fire Management* (NPS, 1998) - Section 5.1 Safety and Health.)

2. **Restore and maintain natural fire regimes to the maximum extent practicable to ensure unimpaired natural ecosystem functioning.**

Initial Objectives:

- By Summer 2004, allow 90 percent of natural fires in the non-suppression unit to burn in order to restore a normal distribution of historic fire frequencies
- For every wildland fire, conduct a "Wildland Fire Implementation Plan, Phase 1" within 2 hours of detection and size-up.
- Record major fire behavior and decisions, determine whether specific objectives are being met and assess fire effects of every wildland fire event.
- Conduct future research to enable the park to determine the role of fire in maintaining selected ecosystems.
- Every three years if funding is provided, identify and evaluate the changes in landscape patterns in and adjacent to the Park that are the result of fires.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* - page 23, Policy Statement #4; *Management Policies 2001* - 4.1 General Management Concepts; *Director's Order #18: Wildland Fire Management* - Section 4 Operational Policies and Procedures.)

3. **Protect Cultural Resources (including prehistoric sites, ethnographic resources cultural landscapes, and historic structures) through the use of hazard fuel reduction, and prescribed fire.**

Initial Objectives:

- If funding is provided, complete a needs assessment/survey of the fire hazards around the Park's developed areas by spring 2005.
- For every wildland fire and wildfire event, identify and implement appropriate management responses and strategies that address site specific cultural and natural resource management concerns.
- By spring 2005, create defensible space using an appropriate fuel reduction technique around vulnerable prehistoric and historic resources. (providing the project is funded)

- By 2007, in 80% of the park's developed zones, change ground fuel conditions so that the predicted flame lengths under extreme weather conditions will be less than four feet. (providing the project is funded)

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* – pages 22-23, Policy statements #3 and #7; *Management Policies 2001* - Section 5.3.1.2 Fire Detection, Fire suppression, and Post-fire Rehabilitation and Protection, and Section 9.1.8 Structural Fire Protection and Fire suppression; *Director's Order #18: Wildland Fire Management* - Section 4.4.c. Operational Policies and Procedures.)

4. Protect Natural Resources (including flora, fauna, air quality, geologic resources, aquatic resources and wilderness character) from adverse effects of wildland fires, fire suppression, prescribed fires, and manual/mechanical treatments.

Initial Objectives:

- For every fire management activity (suppression, prescribed fire, fire use and mechanical fuels reduction), identify and implement appropriate management responses and strategies that address site-specific cultural and natural resource management concerns.
- Annually update fire management program objectives and/or actions, based on the evaluations and results of fire effects monitoring information.
- Include documented mitigation measures to protect air quality values in prescribed burn plans.
- Consider air quality impacts for all wildland and prescribed fires within the go/no go decisions.
- During all wildland fire projects, use strategies that will not exceed 80% of the state standards for carbon monoxide and particulate in smoke sensitive areas and which do not degrade park visibility for more than four consecutive days.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* - page 22, Policy statements # 2 and #3; *Management Policies 2001* - Section 4.1 General Management Concepts, Section 9.3.9 Wilderness Fire Management, and Section 4.5 Fire Management; *Director's Order #18: Wildland Fire Management* - Section 3 NPS Management Policies, Section 4.4.c. Operational Policies and Procedures, and Section 5.10 Debris Disposal.)

5. Reduce hazardous accumulations of fuels near structures, roadways and wildland-urban interface areas.

Initial Objectives:

- Complete a needs assessment/survey of the fire hazards around Park's historic and developed areas by spring 2006, pending the project is funded.
- By spring 2006, once the project is funded, create defensible space using an appropriate fuel reduction technique around vulnerable prehistoric and historic resources.
- By 2007, in 80% of the park's developed zones, change ground fuel conditions so that predicted flame lengths under extreme weather conditions will be less than four feet.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* – page 23, Policy statement #7; *Management Policies 2001* - Section 9.1.8 Structural Fire Protection and Fire suppression; and *Director's Order #18: Wildland Fire Management* - Section 5.9 Fuels Management)

6. Maintain preparedness for park, agency and interagency fire response. Actively participate in regional and national wildland fire response, analysis and management.

Initial Objectives:

- By 2005, the park will have established qualifications and promote staff training to achieve a Type III fire management organization. This team, with the assistance of the surrounding Forests, would be available during fire season and be able to contain 90% of all unwanted fires in the park. Since Mount Rainier NP is not a fire pro park, this objective will need additional dollars allocated by Region in order to be achieved.
- Annually, support the regional and national fire organization, by having employees on area committees or by hosting fire related training within the park.
- Support qualified employees to become members of local and national fire teams.
- Utilize developmental training opportunities in and outside the park yearly, to increase the skills of the staff.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* – page 24, Policy statement #10; and *Director's Order #18: Wildland Fire Management* - Section 5.5 Preparedness)

7. Maximize the efficiency of the fire management program by coordinating with other park divisions, neighboring agencies, Native American Tribes and private land owners. Promote educational awareness of the fire management program in park staff and the general public.

Initial Objectives:

- On an annual basis, review and revise the FMP with adjacent agencies, including the Puget Sound Interagency Communication Center (PSICC).
- Foster a public understanding of fire management objectives through interpretive and educational opportunities annually.
- When funding is available, jointly oversee the preparation, presentation of interpretive, educational programs and/or materials designed to foster understanding of the park fire management program.
- By 2006, with the assistance of the interpretive division, develop and support an informal network of key local and public relation contacts to coordinate fire information in a timely manner.
- Annually review and revise, as needed, the "Public Fire Information Plan" and "Prevention Plan" and delineate a yearly implementation process.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* – page 24, Policy statement #14; *Management Policies 2001* - Section 2.3.1.9 Cooperative Planning, and Section 4.1.4 Partnerships; and *Director's Order #18: Wildland Fire Management* - Section 4.4 Operational Policies and Procedures)

8. Evaluate the costs and benefits of alternative fire management strategies to ensure that financial costs are commensurate with protection or enhancement of resource and wilderness values.

Initial Objectives:

- Annually, review, update and initiate cooperative agreements to assure that interagency approaches to managing wildland fires are implemented.
- Create and maintain annually, mutual support agreements with adjacent land management agencies to allow naturally ignited fires, burning within prescription, to enter or exit adjacent wilderness.
- Meet annually, or as often as needed, with neighboring private landowners, to promote a partnership in managing fires on an ecosystem basis

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* – page 22, Guiding principle #5, and page 24, Policy statements #10 and #11; and *Management Policies 2001* - Section 4.5 Fire Management)

9. Employ adaptive management strategies. Scientifically manage wildland fire using the best available technology. Use information gained through inventory and monitoring to evaluate and improve the program. Develop a better understanding of the role played by humans in historic and pre-historic fire regimes.

Initial Objectives:

- Annually support currently funded research regarding the role of fire in Cascades whitebark pine communities.
- Develop research funding proposals for additional research needs, based on initial whitebark pine study and other identified needs within the next eight years.
- Annually, use research to advance understanding of fire behavior, effects, ecology and management.
- Coordinate with Native American Tribes to compile ethnohistoric information on burning in the park and the surrounding national forests.

10. Integrate fire management with all other aspects of park management.

Initial Objectives:

- Maintain a team approach to fire management where all divisions or expertise within the park and available outside resources are represented and assist in the management of fire within the park.
- Use research to advance understanding of fire behavior, effects, ecology and management.
- Weather- Provide annual fire danger and situation information.

(Basis: *Review and Update of the 1995 Federal Wildland Fire Management Policy* - page 21 Guiding Principle #6; *Management Policies 2001* – Section 2.3.1.5 Science and Scholarship; and *Director's Order #18: Wildland Fire Management* – Section 4.4.g).

B. DESCRIPTIONS OF WILDLAND FIRE MANAGEMENT STRATEGIES

The following strategies and definitions are now recognized as standard National Park Service fire management policy and are described in Reference Manual 18 (RM – 18), an expansive technical manual to DO – 18: *Wildland Fire Management*. Those long familiar with NPS fire management will recognize some changes from past vernacular. Appendix 2: Definitions and the information below is provided to illustrate some similarities with past fire management terminology and to provide definitions of some of the more common terms.

Proactive park fire management benefits resources, protects firefighter and public safety and can prevent undesirable human-caused fires from becoming conflagrations and wildfires from becoming unnaturally extensive as a result of fire suppression.

Using the following fire management strategies, wildland fires, for example, could be managed under a suppression strategy or under a wildland fire use for resource benefits strategy. In other words, the superintendent could decide to immediately suppress the fire or could decide that it met the established conditions for wildland fire use. A suppression strategy could ensure that a fire does not spread beyond a designated fire perimeter, does not grow along a certain boundary or is limited to the minimum extent possible. Established before a fire starts, these criteria are designated with respect to fire fighting response, safety and resource protection issues.

In the same way, a wildland fire used for resource benefits strategy could be employed when a naturally started lightning, but not human-caused, fire occurs under favorable environmental and spatial conditions, creating specific desirable resource benefits for the life of the fire. If, however, the fire fails at any time to meet resource goals, it would be declared a wildfire and then the appropriate suppression response strategy would be employed.

By the same token, prescribed fire could be used, where appropriate, within the park boundary, or in conjunction with adjacent landowners or land managers. Prescribed fires, as with other types of fire, would include specific monitoring programs that record fire behavior, smoke behavior, fire decisions and fire effects and ensure that specified resource objectives are met.

The following fire management strategies will be used as described under the preferred alternative described in the accompanying Environmental Assessment.

WILDLAND FIRES (formerly fire, wildfire, prescribed natural fire)

A “wildland fire” is any non-structural fire, other than prescribed fire, that occurs in a park. This term encompasses fires previously called both wildfires and prescribed natural fires. Wildland fire may be used (as described below) to protect, maintain, and enhance resources and to function in its natural ecological role.

1. Appropriate Management Response

This is the specific management action taken to implement protection and fire use objectives in a Fire Management Unit on a *wildland* fire, regardless of the fire’s ignition source or location. Management responses can vary by fire. Specific and direct action can be taken along the perimeter to stop local spread, or suppression intensity can be maximized across the entire perimeter of the fire.

The fire management strategies described below include: wildland fire suppression, wildland fire use for resource benefits, prescribed fire and hazard fuel reduction (mechanical and other). These may be used singularly or in combination, as appropriate, to best manage park resources. This plan calls for the use of each of these strategies in Mount Rainier National Park.

2. Wildland Fire Suppression

Wildland fire suppression is an appropriate management response to wildland fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire. All wildland fire suppression activities provide for firefighter and public safety as the highest consideration, but minimize loss of resource values, economic expenditures, and/or the use of critical firefighting resources (NPS, et al., 1998).

A variety of fire suppression techniques are used to break the continuity of forest fuels, cool a fire, and slow the advance of a flaming front. Actions may include construction of fire lines; cutting of vegetation; application of water, foam or retardant; and the application of fire. Most park fires are small and can be suppressed using hand tools - sometimes supported with a chainsaw for cutting fuels, a fire engine or portable pump for delivering water; and/or a helicopter to transport water, supplies, and firefighters. Larger fires or fires with greater potential to spread may require the use of drip torches, fusees, fire line explosives, retardant-filled aircraft or extensive water drops.

3. Wildland Fire Use for Resource Benefits (WFURB)

(Formerly also prescribed natural fire and prescribed fire)

Wildland fire use is the management of *naturally ignited wildland fires* to accomplish specific pre-stated resource management objectives in pre-defined geographic areas as outlined in a fire management plan. Wildland fire use is contrasted with “fire use”, which is a broader term encompassing more than just wildland fires, and is defined as the combination of wildland fire use and prescribed fire application to meet resource objectives.

For purposes of this Plan, the terms *Wildland Fire for Resource Benefits (WFURB)* and *wildland fire allowed to accomplish resource objectives* are similar. The WFURB applies to NPS lands, while the latter term applies to BLM-managed lands.

Wildland fire managed for resource benefits will usually result in a wide range of fire intensity and severity across the landscape. This diversity of fire behavior will result in the desired effect of vegetative mosaics, including varying composition and age classes in a park ecosystem. Wildlife habitat is created and benefits from this natural variation in the continuum from severely burned to unburned landscape and in the way it recovers naturally following succession.

To fulfill the purposes of this plan, wildland fire use for resource benefits may:

- assist in the management of park vegetation (enhance community health, insect and disease control, control exotics);
- enhance wildlife and plant species habitat;
- assist in the management of endangered/sensitive species;
- achieve specific cultural resources management objectives; and
- re-establish fire as a viable management tool to enable the park ecosystem to more closely mimic natural fire regimes.

4. Fuels Management

A map can be viewed of this area by linking to web site:

[Vegetation Species](#)

[Vegetation](#)

[Vegetation Zones](#)

a. Prescribed Fire

Prescribed Fire is any fire ignited the direction of management actions to meet specific objectives. The fuels to be burned may be in either their natural or modified state. The prescribed burn would take place under specified environmental conditions (e.g. weather and fuel moisture); would be confined to a predetermined area with a pre-determined range of fire intensity and rate of spread. These would enable attainment of planned management objectives, including conformance with an approved prescribed fire plan that meets NEPA and NHPA requirements prior to ignition.

The “prescription” for a prescribed fire contains key weather and fire behavior parameters necessary to achieve desired fire behavior and results. For example, a prescription might specify that the air temperature must be between 50 and 75 degrees Fahrenheit; the relative humidity between 45 and 70 percent; the 20-foot wind speed between 5 and 25 miles per hour; wind direction from the west to southwest; and the flame length less than 4 feet. The actual prescription for a project would depend on site conditions and the objectives that are to be met. An approved prescribed fire plan is required for all prescribed fires prior to ignition.

As envisioned, Prescribed Fires could be used to:

- maintain scenic vistas;
- maintain fire dependent plant communities;
- maintain some boundary areas (where cross-boundary fire was unacceptable);
- manage sensitive resource areas that would need to have cooler fires with lower intensities to prevent damage to the resource at risk;
- restore historically documented cultural or traditional landscapes; and to
- reduce hazard fuel accumulations near developed areas, etc.

Prescribed Fires would include measurable criteria (the prescription) to define the specific environmental conditions under which park managers would ignite a fire. Prescription criteria include weather conditions (current and forecast), description of the prescribed fire project boundary, appropriate holding force availability, fire starting techniques and timing. These prescription criteria would help to ensure that the fire remained within a pre-designated perimeter without threatening life or property and met resource objectives. To the extent possible, Prescribed Fire (as well as Wildland Fire Use) implementation would:

- use natural barriers rather than constructed fire lines to prevent fire spread and to minimize consequent impacts to soils and other park resources;
- minimize up and down slope fireline construction;
- utilize controlled burn intensities to result in a fast-moving, lower temperature impact fire; and
- require post-fire rehabilitation of fire lines, including efforts to reduce compaction by scarifying the soil, and installing natural erosion barriers.

Although there are currently no plans to conduct Prescribed Fire within Mount Rainier National Park, under future implementation of the FMP, such a plan would be written and separate environmental analysis would be conducted for each series of proposed Prescribed Fires. The most likely areas that would be targeted for Prescribed Fire would be the whitebark pine community and potential research burns in forested or subalpine communities. Other Prescribed Fire use might include establishing a very limited, but more frequent fire regime around developed areas where great concentrations of important historic structures are located, such as at Longmire and Paradise. Finally, Prescribed Fire might also be used to ensure that fire did not cross the park boundary where the adjacent landowner was unwilling to accept or unable to manage wildland fire.

Under future prescribed fire plans, burn objectives will reflect specific environmental conditions to be achieved for the fuel type involved. Ignition and burn patterns will vary temporally and spatially across the landscape in order to ensure diversity in future vegetative structure and composition.

The primary goal of the prescribed fire program under this Plan will be to restore fire as a natural ecological process. A secondary goal, in some areas, may be reducing hazard fuels concentrations (see below).

b. Hazard Fuel Reduction: Manual/Mechanical Treatment

Manual treatment is the use of hand-operated power tools and hand tools to cut, clear or prune herbaceous and woody species. It is a method of reducing hazardous accumulations of wildland fuels, and is often used to create defensible space near structures. In the park, manual treatment could be used 1) to remove excess woody debris from the ground; 2) to remove “ladder” fuels, such as low limbs and brush (which could carry fire from the forest floor into the crowns of trees); and 3) to thin dense stands of trees, near developed areas, to reduce the horizontal continuity of fuels. Occasionally, larger mechanized equipment (a boom truck and front end loader) would be used to move large boles, with the restriction that the equipment would not be driven off road or used outside of developed areas. Material cut or gathered through manual/ mechanical treatment would either be cast back on site, be disposed of by piling and burning: either on-site or at an established burn pit or depending on the size, quantity and location of woody materials, could be chipped or utilized .

Hazard fuel reduction is the use of either prescribed fire or mechanical treatment to reduce accumulations of fuel inconsistent with fire management goals. Hazard fuel reduction can be applied to developed or wildland areas and as with other fire management strategies is used to achieve specific resource protection objectives.

Hazard fuel reduction is often accomplished through a well-planned series of projects that includes both non-fire treatment (mechanical fuels reduction) and prescribed fire treatment. In hazard fuels reduction, many areas subject to initial treatment may require subsequent treatment(s) to achieve hazard fuels reduction objectives and to avoid the risks of costly escape and/or unacceptable resource damage.

Non fire hazard fuels reduction treatments may include, but are not limited to, pruning, thinning, lop/scatter, piling and burning, chipping/mulching, utilization for park needs and firewood removal by the public where authorized.

Mechanical fuels reduction is the use of mechanized equipment to reduce fuels in a specific area. It could range from the use of chainsaws to the use of heavy equipment, depending on the project location and objectives.

Overall, the beneficial outcome of hazard fuel reduction is that firefighter and public safety is enhanced and real property, natural and cultural resources are protected. In addition, potential suppression

costs are significantly reduced, and, when prescribed fire is used, the restoration of fire into fire-adapted landscapes is initiated. Often the primary objective of hazard fuels reduction may be to prepare a prescribed fire unit by establishing control lines, clearing around values at risk, or treating selective areas, where an unnatural buildup of fuel may threaten control lines or potentially result in an unwanted crown fire.

c. Hazard Fuel Reduction: Debris Burning

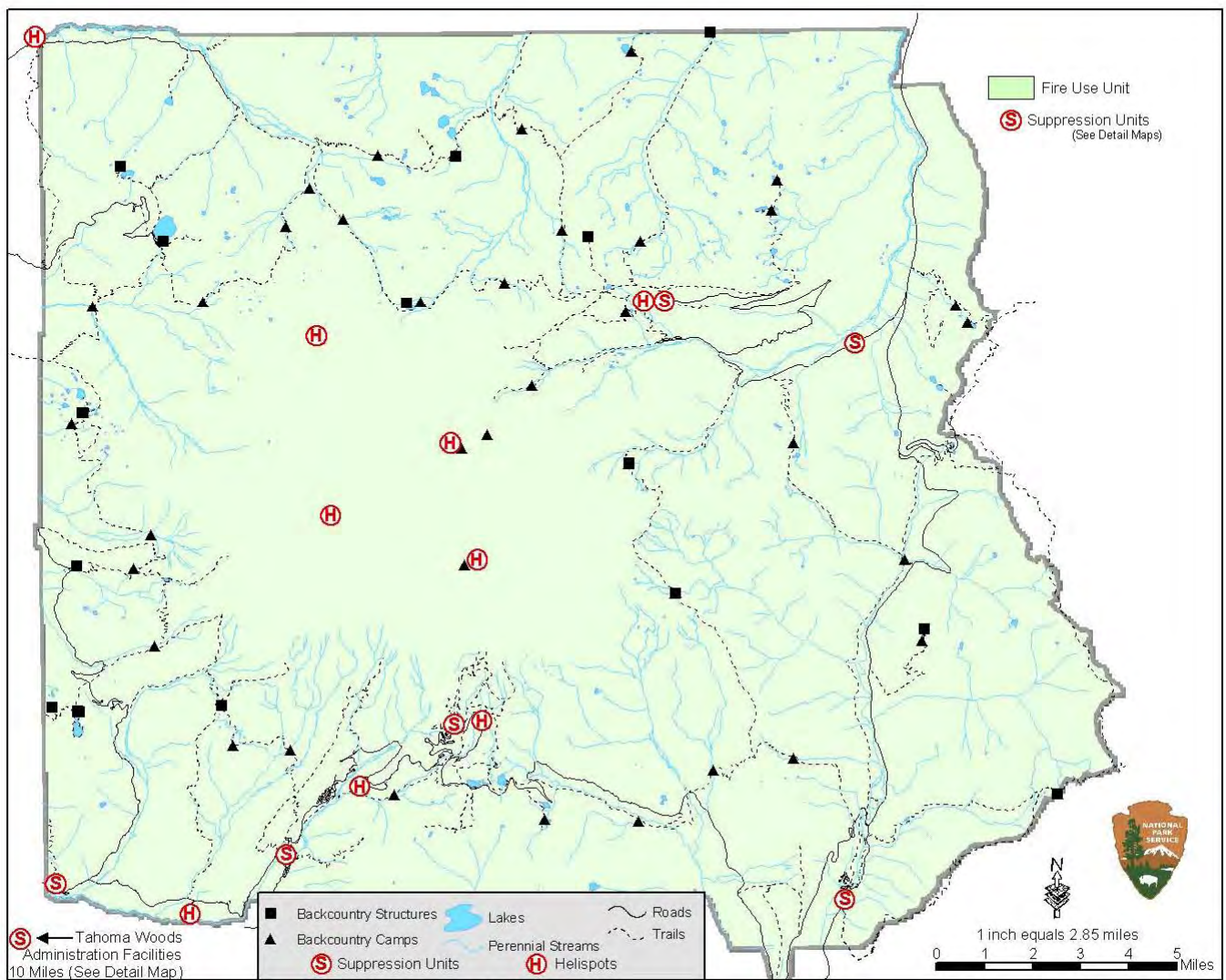
Debris disposal is burning of wildland fuels generated from maintenance activities (such as grass or brush mowing or clippings), hazard tree removal, or during construction activities. These materials must be deemed infeasible or impractical to mechanically remove and must be in a non-wildland fuel environment (parking lot, boneyard, gravel pit, etc.) Any material being burned for debris disposal must be classified as permissible to burn under applicable Federal, State, Tribal and Local regulations.

Debris burning (in small piles) is used to dispose of vegetative material that has been concentrated by manual or mechanical methods.

5. Ecosystem Management

This Plan meets park resource protection goals by incorporating a collaborative approach to fire that recognizes and includes fire management objectives by the park and the diverse public and private landowners along its boundary. To achieve these stated protection goals the GMP requires that a regional perspective be considered, including the recognition that actions taken on lands surrounding the park directly *and* indirectly affect the park. Many of the threats to park resources come from outside the park boundary, further increasing reliance on an ecosystem approach to understand and manage the park's natural resources.

Cooperative agreements now in place and those set up through this plan will ensure that park fire management adequately focuses on an ecosystem approach. Although agency goals may differ, allowing fire to cross land management boundaries will lead to better overall resource protection in the park. To the extent possible, that goal is part of this Plan.



C. FIRE MANAGEMENT UNITS

A map of the area can be viewed by linking to the web:

[Fire Management Units](#)

[Forest Age](#)

[Suppression Zones](#)

To enable fire management plans to be more effective, *fire management units* are designated. A *fire management unit* (FMU) is any land management area defined by common objectives, land features, access, values to be protected, political boundaries, fuel types, major fire regimes or agency designated special management areas (i.e. wilderness area). Each FMU contains fire management strategies, including possible constraints that would accomplish pre-defined objectives.

Two fire management units have been established for Mount Rainier National Park: 1) *suppression* and 2) *wildland fire use* (Fire Management Units Map). In both units, all human-caused wildland fires would be suppressed and prescribed fire or hazard fuel reduction may be used to reduce unnatural fuel accumulations or to achieve management or resource objectives. In the wildland fire use unit, naturally ignited wildland fires may be permitted to burn, or they may be confined, or suppressed, depending on the results of fire analysis. Where suppression occurs, minimum impact suppression techniques (MIST) would be used to prevent or minimize the effects of suppression on park wilderness. The wildland fire use unit is further divided into twelve *operational areas*, within which varying fire management strategies would be employed, depending on variables present at the time of natural fire ignition. Upon a change in NPS/national wildland fire management policy appropriate human-caused fires would possibly be considered for Wildland Fire Use.

These operational areas would be described in a future Park operational guide and would include the following specific information to assist fire managers in better managing park fires. Additional specific information would include: vegetation, fuel models, fuel types, fire history, values at risk/or to be protected, including historic structures, rare species habitat, aquatic resources, archeological resources, and other factors such as acceptable fire behavior and conditions. To the extent possible, the operational areas use roads, rivers, ridges, valleys, and other natural and man-made fuel breaks to form zone boundaries. Adjacent lands, park facilities and ease of access were taken into consideration when designating area boundaries.

1. FMU – 1: Suppression Unit

In this unit, the primary goal would be to prevent or minimize the loss of historic and administrative structures by aggressively suppressing fire as it occurs and by more intensively treating the edges of developed areas, while ensuring the preservation of resources, firefighter and public safety.

Fire Management Strategies

Hazard Fuel Reduction (including prescribed fire and Manual/Mechanical fuel reduction)

Where appropriate, prescribed fire and hazard fuel reduction including, Manual/Mechanical treatment to modify fire behavior through the alteration of fuel loads, thereby reducing the threat of fire by providing a defensible space around structures, would be used.

Wildland Fire Suppression

All wildland and human-caused fires would be controlled as quickly as possible. Containment or control actions will be executed in an economical and ecologically sensitive manner to minimize the impacts of suppression on park resources.

Strategic and Measurable Fire Management Objectives

Initial Objectives:

In addition to the objectives stated above, the following would be added:

- Facilitate the preservation of park historic buildings, structures and cultural landscapes in developed areas by conducting systematic Manual/Mechanical treatment of hazardous accumulations of fuel near these facilities. Treat 20 percent of the appropriate park area per year.
- Create defensible spaces, where possible, around developed areas to provide an additional measure of protection for facilities in these areas. By 2006, identify defensible spaces around National Historic Landmark District contributing structures.
- As structures are rehabilitated, increase the use of fire suppression systems and other structural improvements that meet the Secretary of Interior's Standards for Rehabilitation of Historic Structures, resulting in no adverse effect.

Management Considerations to Operational Implementation

In the Suppression Unit (FMU – 1):

- Values at risk are not located in wilderness.
- There are a significant number of historic buildings and structures and/or park developed area and administrative area infrastructure.
- This FMU is primarily comprised of the Mount Rainier National Historic Landmark District.
- There are high concentrations of staff and/or visitors in developed and administrative facilities.
- Due to the distance from fire fighting resources, structural fire fighting is essentially limited to building fire suppression systems.
- Fire is a threat to human safety, recreational and administrative facilities, natural, historical and cultural resources.

Park Operations and Visitor Services

There would be a wide range of impacts to park operations and visitor services. Under fire suppression or use management scenarios, these impacts would include changes in visitor services, redirection in park operations and potential human health and safety impacts.

For the most part, park fire operations are funded out of national sources and do not result in major impacts on park operations budgets. Although there would be some opportunity to “backfill” positions, for instance, where firefighters were called out of the park for long periods, many short-term call-outs would be absorbed by park operations. This could result in fewer staff available to manage a variety of park operations during periods of high national alert or extensive park fire management operations.

Firefighters come from within the organization as a whole, including administration, maintenance, law enforcement, resources, and interpretation staff. Trained firefighters are available to park, agency and interagency operations. During periods of high national alert or extensive park fire management operations, there could be fewer staff in visitor centers, reduced visitor center operations, cancellations in interpretive programs such as walks and talks, fewer patrols of park campgrounds, and other effects on visitor services. These impacts would be partially compensated for by the provision of increased fire information to visitors, the media and park staff.

As appropriate, park developed areas, such as Longmire, Paradise, Carbon River, Ohanapecosh and others would be used to stage fire operations, including personnel, fire camps, etc. In localized fire management efforts, portions of park campgrounds, even whole campgrounds, could be closed to visitor use, to provide for public safety or to facilitate fire suppression efforts. As a result, there could be a wide range of reduced visitor services, including negligible to moderate trail, road and area closures that would have concurrent changes in visitor services as well. These could result in loss of

concession revenue, interruptions in scientific studies, and changes in the way park visitors would access services and facilities. Loss of concession revenue would be compensated for (to the degree possible) by increased use of concession facilities to stage fire management operations out of. Closures in visitor use of these facilities would be limited to the degree possible since the experiences they provide would be protected in a similar manner to sensitive park resources and facilities. Increased air operations for fire monitoring or suppression or evacuations would result in increased noise and activity and could increase safety hazards for visitors and employees.

Physical and Biotic Characteristics

The Suppression Unit includes the majority of park administrative facilities, including access roads and developed visitor use areas at the Nisqually and White River entrances, and the administrative/visitor use facilities at Ohanapecosh, Longmire, Paradise and Sunrise. It does not include administrative facilities at the Carbon River Entrance. Other historic structures not included in this unit are included in the Wildland Fire Use FMU as discontinuous values at risk and would be protected to the degree possible from damage or destruction.

This FMU includes a broad range of low and high elevation forest and subalpine community types, including the western hemlock, mountain hemlock, pacific silver fir and subalpine fir zones. It does not, however, include the alpine zone. Specific characteristics of the various areas within this zone are described below.

Areas of Special Concern

The Suppression Unit (FMU –1) contains the following major park developed areas.

The following maps can be viewed by linking to the web:

[Longmire](#)
[Nisqually Entrance](#)
[Ohanapecosh Campground](#)
[Paradise](#)
[Sunrise](#)
[Tahoma Woods](#)
[White River Entrance](#)

Nisqually Entrance Administrative Area (Nisqually Suppression Map):

The Nisqually Entrance Administrative Area, located in the southwest corner of the park, in the western hemlock zone is easily accessed via State Route 706 East. Although this area is not as well developed as other park administrative areas, there are several significant historic structures, including the Oscar Brown Cabin and Nisqually Entrance Ranger Station, and several park residences.

Recently a 78,000-gallon water tank was installed to provide additional fire protection in this area. There are four fire hydrants and a maximum of 45 lbs. of pressure for firefighting. At the Nisqually Entrance, there are 10 structures [nine of which contribute to the Nisqually Entrance Historic District and the Mount Rainier National Historic Landmark District (NHLHD)]. The Sunshine Point Campground, open year-round, has 18 campsites, includes picnicking and contains one restroom.

Longmire Administrative/Visitor Use Area (Longmire Suppression Map):

Longmire contains the greatest concentration of historic and residential buildings and structures in the park. There are approximately 88 total structures, of which approximately 58 are historic, including three National Historic Landmark buildings (Longmire Administration Building, Longmire Service Station and Longmire Community Building).

Longmire is located approximately six miles east of the Nisqually Entrance on the Nisqually to Paradise Road in the western hemlock zone. There is also administrative/emergency access to

Longmire via Forest Service Road 52 (Kernahan/Skate Creek Road) which enters the park from the south. Longmire has a year-round employee population (20 residents) and a seasonal (primarily May or June through September) resident population of 60 or more. Finally, There is a non-resident work population at Longmire (100+). Finally, Longmire contains the historic National Park Inn, with 25 guestrooms.

A small (formerly public) VIP campground and wastewater treatment plant is located across the Nisqually River from Longmire, near the Community Building. Longmire also contains a large potable water system, an historic museum, an inn and a front country nature trail (Trail of the Shadows).

Approximately two miles up the Nisqually to Paradise Road from Longmire is Cougar Rock Campground, with approximately 173 sites and six structures (restrooms and ranger station) and generally open from May until October, although some winter camping use also occurs. Longmire has 200,000 gallons of water storage capacity and approximately 90 lbs. per square inch available water pressure.

Paradise Administrative/Visitor Use Area (Paradise Suppression Map):

Paradise is approximately 15 miles east of the Nisqually Entrance on the Nisqually to Paradise Road. Paradise may also be accessed from May until October or November via the Stevens Canyon Road from State Route 123.

There is currently a one-way exit from Paradise via the Paradise Valley Road that ends at the Stevens Canyon Road. Paradise, located in the Pacific silver fir zone, contains approximately 21 structures of which approximately seven contribute to the Paradise Historic District and the Mount Rainier NHL, including the Paradise Inn National Historic Landmark Building, the Skyline Trail and the Paradise Guidehouse.

Paradise is home to the approximately 40 seasonal residents and the seasonal Paradise Inn, with approximately 117 rooms. A major potable water system, wastewater treatment plant, large picnic area and the park's main visitor center are also located at Paradise. Based on parking, there are two distinct visitor access areas at Paradise – the upper and lower parking lots. Paradise provides hiking and climbing access to the upper Mountain, especially Camp Muir. Paradise has 250,000 gallons of water storage and approximately 85 lbs. per square inch available water pressure.

White River Entrance Administrative Area (White River Suppression Map):

The White River Entrance provides public and administrative operations, including fee collection, public restroom facilities, wilderness information, backcountry ranger office, and maintenance and ranger housing. This historic entrance to the park was recognized in the White River Entrance Historic District, which includes the Ranger Station, the men and women's comfort stations and the mess hall/dormitory.

The White River Ranger (Entrance) Station was built in 1929 by the NPS and the Mess Hall/Dormitory was built either for, and/or by the Civilian Conservation Corps in 1933. The White River fee booth was constructed much later. These facilities are essential to ensuring NPS administrative operations in the White River developed area of Mount Rainier National Park. Visitors using the White River facilities may be day-use visitors (White River/Sunrise Area), overnight backcountry visitors (Wonderland Trail, etc.) or overnight campers (112-site with restrooms White River Campground).

The White River area is located in the silver fir/mountain hemlock zone. Within this intermediate forest, the vegetation is dominated by the Silver fir (*Abies amabilis*)/Alaska huckleberry (*Vaccinium alaskaense*) vegetation type. This vegetation association is the most extensive type in Mount Rainier National Park. The White River Entrance has approximately 20,000 gallons of water storage and approximately 10 lbs. per square inch available water pressure.

The silver fir/Alaska huckleberry vegetation type is the most extensive in the park. Mature forests of this type lack temperature and moisture extremes and are comprised primarily of western hemlock, silver fir and Douglas-fir. Alaska yellow cedar (*Chamaecyparis nootkatensis*) and noble fir (*Abies procera*) are also common. Common understory shrubs include huckleberry (*Vaccinium* sp.), Oregon grape (*Berberis nervosa*), salal (*Gaultheria* sp.), etc. Common forbs include vanilla leaf (*Achlys triphylla*), trillium (*Trillium ovatum*), wood sorrel (*Oxalis oregana*), false Solomon's seal (*Smilacina racemosa*), bead lily (*Clintonia uniflora*), anemone (*Anemone deltoidea*), etc. Common ferns include sword fern (*Polystichum munitum*), deer fern (*Blechnum spicant*) and others. As with any forested area in the northwest, a wide variety of mosses, fungi and lichens are also abundant.

Ohanapecosh Administrative/Visitor Use Area (Ohanapecosh Suppression Map):

The Ohanapecosh area is located in the Pacific silver fir/western hemlock zone and is dominated by the following tree associations at low elevations, such as are present in the Grove of the Patriarchs). Silver fir/devil's club, silver fir/Alaska huckleberry (including the Oregon grape phase), western hemlock/vanilla leaf, western hemlock/devil's club, and western hemlock/salal plant associations.

Ohanapecosh contains a visitor center, administrative facilities (including a ranger station, housing, and maintenance area), and a large campground with 205 sites and seven restrooms, including several historic restrooms. Ohanapecosh has 50,000 gallons of water storage and approximately 100 lbs. per square inch available water pressure.

The Grove of the Patriarchs is an excellent example of a streamside community long-protected from fire (Franklin *et al.* 1988). Some of the trees in the Grove and beyond near the confluence of Chinook Creek and the Ohanapecosh River, trees are estimated to be over 1000 years old. The largest trees are western red cedar, western hemlock and Douglas-fir. In addition, this diverse forest contains subalpine fir (*Abies lasiocarpa*), Pacific silver fir (*Abies amabilis*), Alaska yellow cedar (*Chamaecyparis nootkatensis*) and red alder (*Alnus rubra*). Shrubs include vine maple (*Acer circinatum*), salal (*Gaultheria shallon*), elderberry (*Sambucus racemosa*), salmonberry (*Rubus spectabilis*), huckleberry (*Vaccinium* sp.), beaked or California hazelnut (*Corylus cornuta*), and thimbleberry (*Rubus parviflorus*), etc. Forbs include western tea-berry (*Gaultheria ovatifolia*), skunk cabbage (*Lysichiton americanum*), bead lily (*Clintonia uniflora*), vanilla leaf (*Achlys triphylla*), twinflower (*Linnaea borealis*), violets (*Viola* sp.), five-leaved bramble or trailing raspberry (*Rubus pedatus*), foam flower (*Tiarella trifoliata*), miner's lettuce (*Claytonia perfoliata*), bleeding heart (*Dicentra formosa*), stinging nettles (*Urtica dioica*), pathfinder (*Adenocaulon bicolor*), trillium (*Trillium ovatum*), and wild ginger (*Asarum caudatum*), etc. Ferns include bracken fern (*Pteridium aquilinum*), lady fern (*Athyrium filix-femina*), oak fern (*Gymnocarpium dryopteris*), sword fern (*Polystichum munitum*), maidenhair fern (*Adiantum pedatum*), etc. There are also a wide variety of mosses, liverworts and lichens.

Sunrise Administrative/Visitor Use Area (Sunrise Suppression Map):

The Sunrise area, located within the subalpine fir zone, contains historic administrative and public use facilities, including approximately 15 historic structures and buildings including overlooks, a picnic area, the Sunrise Stockade Complex (also a NHL building), and the Sunrise Lodge. Sunrise also contains some park housing, a visitor center, a large septic system, a potable water system and a large generator. Sunrise has available water storage (Frozen Lake) ranging from a low of 500,000 gallons to a high of one million gallons and approximately 120 lbs. per square inch of available water pressure.

Sunrise vegetation is a mosaic of tree clumps and herbaceous meadows. Tree clumps are dominated by subalpine fir (*Abies lasiocarpa*), Engelmann spruce (*Picea engelmannii*) and white bark pine (*Pinus albicaulis*). Herbaceous meadows are composed of a mosaic of dry grass and heath-shrub vegetation communities (Henderson 1973). Dry grasses are the most common, and are dominated by green fescue (*Festuca viridula*), lupine (*Lupinus latifolius*), paintbrush (*Castilleja* sp.), and asters (including *Aster alpinus* and *A. ledophyllus*). Heath-shrub vegetation is found in moister sites and is dominated by white heather (*Cassiope mertensiana*) and red heather (*Phyllodoce empetriformis*).

Tahoma Woods Administrative Headquarters Area (Tahoma Woods Suppression Map)

Tahoma Woods, located between Elbe and Ashford approximately 3 miles from each, is the park's administrative headquarters, containing administrative operations, including the office of the superintendent, budget, personnel and other administrators in one structure. Nearby are 15 (3-bedroom) houses, a greenhouse, a maintenance storage area, and an air quality monitoring station, two 8-unit apartment buildings and a future education center.

Tahoma Woods has 150,000 gallons of water storage and approximately 45 lbs. per square inch of available water pressure.

Tahoma Woods is located in the western hemlock zone, which is characterized by thick forests of western hemlock, western red cedar and Douglas-fir. Deciduous species (usually along water courses) include: red alder (*Alnus rubra*), black cottonwood (*Populus trichocarpa*) and bigleaf maple (*Acer macrophyllum*). Common understory shrubs include: vine maple (*Acer circinatum*), Oregon grape (*Berberis sp.*), red huckleberry (*Vaccinium parvifolium*), devil's club (*Oplopanax horridum*), salal (*Gaultheria shallon*), red-flowering currant (*Ribes sanguineum*), etc. Common forbs include: vanilla leaf (*Achlys triphylla*), trillium (*Trillium ovatum*), wood sorrel (*Oxalis oregana*), false Solomon's seal (*Smilacina racemosa*), bead lily (*Clintonia uniflora*), spotted coralroot (*Corallorhiza maculata*), anemone (*Anemone deltoidea*), bunchberry dogwood (*Cornus canadensis*), miner's lettuce (*Montia sibirica*), inside-out flower (*Vancouveria hexandra*), etc.

Common ferns include sword fern (*Polystichum munitum*), deer fern (*Blechnum spicant*), bracken fern (*Pteridium aquilinum*), etc. As with any lowland forest, a wide variety of mosses, fungi and lichens are also abundant.

Despite the fact that Tahoma Woods is second growth (having been logged in the 1800s and 1960s while owned by Weyerhaeuser Company prior to its purchase by the National Park Service). The forest is relatively intact, containing a wide variety of understory species and a diverse array of wildflowers in season. Interspersed at Tahoma Woods is a cultivated lawn of perennial rye and red fescue bisected by gravel and asphalt driveways, roads and parking.

2. FMU 2— Wildland Fire Use Unit

The purpose of the wildland fire use unit is to encourage fire as a natural disturbance that results in a landscape mosaic of varying species composition and structure. Dependent on variable analysis at the time of fire occurrence, naturally ignited wildland fires could be allowed to burn as a wildland fire use project or confined, or suppressed. As with the Suppression Unit, all human-caused fires would be immediately suppressed. In addition, similar to the Suppression Unit, prescribed fire and hazard fuel reduction strategies would be used to sustain a natural fire regime or used as tools to achieve stated management or resource objectives.

Strategies

- Manage the FMU to maximize wildland fire presence to the fullest extent possible while protecting values at risk.
- All unwanted wildland fires would be suppressed using the appropriate fire suppression response options, determined by a Wildland Fire Situation Analysis (Appendix 20), supported by information from a Wildland Fire Implementation Plan (Stage I)
- All naturally occurring fires within this unit would be reviewed for appropriate classification and management response. A Wildland Fire Implementation Plan (Appendix 17) will be completed for each ignition and the fire will be declared either for Wildland Fire Use or appropriate suppression. Some fires may require suppression actions around the entire perimeter, while others may only be managed on a specified flank to limit spread into a certain area.
- Fires not suppressed and allowed to play out a natural role in the environment will be monitored daily to gain knowledge and data on fire behavior and ecological effects, as well as to keep a close watch on fire activity. A daily validation of current and expected fire behavior and analysis of the continuation of ongoing fire management strategies as part of the WFIP would be completed. If a natural wildland fire exceeds the prescription at any time it shall be declared a wildfire and appropriately suppressed.
- Where necessary to meet fuel reduction objectives, approved fuels management techniques, including prescribed fire would be used to modify localized fuel concentrations leading to fire behavior more conducive to successful wildland fire suppression tactics.

Management Considerations to Operational Implementation

- This FMU-2 is primarily comprised of wilderness.
- A number of backcountry historic buildings, including four fire lookouts, eight cabins, and three shelters, as well as, more than 50 historic structures are part of the National Historic Landmark District and are included in this FMU. The historic structures include bridges, overlooks, culverts, tunnels, roads, trails, monuments and dams.
- This FMU includes minor developed areas such as Mowich Lake, Carbon River Entrance, Ipsut Creek Campground, Reflection Lakes, Tipsoo Lake, Box Canyon, Narada Falls, Ricksecker Loop Road, etc.
- Potable and non-potable water delivery systems, as well as other park utility systems, that service park developed areas are included in this unit.
- The islands of park developed areas that comprise FMU – 1, the Suppression Unit, are encompassed by this FMU.
- There are several major roads that access various portions of this Unit; however, most access is via trail.
- There are a number of known and unknown rare, threatened and endangered species issues in this FMU.

Physical and Biotic Characteristics

Elevations range from 1,600 feet to 14,410 feet. The area above 7,000 feet, however, is primarily snow, rock and ice and is of little concern from a wildfire perspective. Topography ranges from low elevation river valleys to alpine areas, containing deep valleys and numerous peaks. Nine major rivers cut through or border this zone. Annual precipitation may be up to and over 100 inches, falling primarily as rain below 5,500 feet and as snow above. Historically, the highest incidence of recorded lightning fires has occurred in this unit between 4,500 and 5,500 feet.

This FMU includes a broad range of low and high elevation forest and subalpine community types, including the Western Hemlock, Mountain Hemlock, Pacific Silver Fir, Subalpine Fir, and Alpine generalized vegetation types.

Access to FMU – 2 is provided by State Highways 123 and 410, the Westside Road, Nisqually to Paradise Road, Stevens Canyon Road, White River-Sunrise Road, Carbon River Road, and the Mowich Lake Road but would primarily be accessed via designated trails and cross-country travel.

Areas of Special Concern

The Areas of Special Concern would echo the list of suppression units which is the Park's developed areas and historic structures. See earlier descriptions under Fire Management Suppression Units and the appendices that list the building within the Park.

Park Operations and Visitor Services

There would be a wide range of impacts to park operations and visitor services. Under fire suppression or use management scenarios, these impacts would include changes in visitor services, redirection in park operations and potential human health and safety impacts.

For the most part, park fire operations are funded out of national sources and do not result in major impacts on park operations budgets. Although there would be some opportunity to "backfill" positions, for instance, where firefighters were called out of the park for long periods, many short-term call-outs would be absorbed by park operations. This could result in fewer staff available to manage a variety of park operations during periods of high national alert or extensive park fire management operations. Firefighters come from within the organization as a whole, including administration, maintenance, law enforcement, resources, and interpretation staff.

Trained firefighters are available to park, agency and interagency operations. During periods of high national alert or extensive park fire management operations, there could be fewer staff in visitor centers, reduced visitor center operations, cancellations in interpretive programs such as walks and talks, fewer patrols of park campgrounds, and other effects on visitor services. These impacts would be partially compensated for by the provision of increased fire information to visitors, the media and park staff.

As appropriate, developed areas, such as Longmire, Paradise, Carbon River, Ohanapecosh and others would be used to stage fire operations, including personnel, fire camps, etc. In localized fire management efforts, portions of park campgrounds, even whole campgrounds, could be closed to visitor use, to provide for public safety or to facilitate fire suppression efforts. As a result, there could be a wide range of reduced visitor services, including negligible to moderate trail, road and area closures that would have concurrent changes in visitor services as well. These could result in loss of concession revenue, interruptions in scientific studies, and changes in the way park visitors would access services and facilities.

Loss of concession revenue would be compensated for (to the degree possible) by increased use of concession facilities to stage fire management operations out of. Closures in visitor use of these facilities would be limited to the degree possible since the experiences they provide would be protected in a similar manner to sensitive park resources and facilities. Increased air operations for fire monitoring or suppression or evacuations would result in increased noise and activity and could increase safety hazards for visitors and employees.

As needed rehabilitation efforts to reopen closed portions of the park to visitor use would occur, including analysis of safety issues, such as the potential for hazards left from fire management operations, etc. Others would include repairs to existing roads, bridges or other damaged facilities; installation of water bars where increased runoff would be expected; culvert and roadside ditch cleaning or installation of racks or screens to facilitate potentially increased runoff, etc. There would also be a variety of ongoing post-fire monitoring to:

- assess fire effects on park resources;
- ensure that treatment or rehabilitation measures were working as designed;
- determine when the usefulness of rehabilitation measures has been exhausted; and to
- conduct condition assessments of fire damaged facilities, etc.

In addition to the effects of the above-described effects on ongoing park operations, there would be an increased potential for park staff and, in some cases, visitors, to be exposed to a wide variety of human health and safety effects. Most of these would relate to firefighters, including encountering steep slopes, uneven terrain, variable fire behavior, smoke emissions, proximity to flames, and other changing environmental conditions. Wildland firefighting and other fire operations require the use of sharp hand tools, power tools and aircraft, including small planes and helicopters.

A primary goal of fire management is to ensure safety for fire fighters, visitors, residents and park employees and to protect property and other values at risk. As a result, all management activities would be evaluated to determine risks to human health and safety. No action that threatens human safety would be taken, unless that threat can be mitigated using standard approved fire management techniques (such as guidelines for constructing fire line downhill, LCES (establishing lookouts, communications, escape routes and safety zones), and following the ten standard fire orders. All personnel on fires will have and use recommended PPE and will receive a briefing using the briefing checklist in the Incident Response Pocket Guide.

The risks of these operations would be managed through the use of established safety precautions, including those listed below.

- Use of safety guidelines in the Fireline Handbook (National Wildfire Coordinating Group Handbook 3, January 1998). These guidelines include, but are not limited to, use of personal protective equipment (PPE), standard fire orders, watch-out situations, and safety issues common to large fires.
- Job Hazard Analyses (JHAs) prepared to identify hazards and mitigation related to individual fire positions and activities.
- Qualifications standards. All personnel assigned to fires must meet NPS and interagency wildland fire qualification standards.
- Site Specific Plans (including Wildland Fire Situation Analyses, Prescribed Burn Plans, Hazard Fuel Reduction Project Plans, Incident Action Plans, and Wildland Fire Implementation Plans.
- Washington State Smoke Management Plan. All prescribed burning and debris disposal would comply with regulations contained in the Washington State Department of Natural Resources Smoke Management Plan. Small burn piles would range from 4 feet by 4 feet (4'x 4') to 10'x10', and would contain less than 100 tons (109,718 kilograms) of natural vegetation. (This meets the definition of small fires under the smoke management plan.)

- For prescribed fires that would consume 100 tons or more of material, the park would apply to Washington Department of Natural Resources, with consultation from the Department of Ecology. Burns would be timed to minimize smoke impacts on air quality and visibility utilizing favorable conditions of atmospheric stability, mixing height and transport winds. No piles would be ignited during smoke management burn bans or visibility protection periods (including from the 4th of July to Labor Day).
- Daily evaluation of fire danger ratings.
- Ongoing public and employee education.
- Campfire restrictions. During periods of high fire danger the Superintendent may restrict campfires to reduce the chance of escaped or unwanted fires: information about current fire restrictions is made available to the public through press releases; notices provided at ranger stations, visitor centers and trailheads; and visitor contacts. The Park should try and coordinate with neighboring agencies and the State to show consistence with the Public, when it comes to fire restrictions.
- Area closures: If wildland fires or wildland fire use pose an imminent threat to human health or safety, the park Superintendent may close all or a portion of the park, including trails and roads, based on recommendations from the Incident Management Team. Park personnel will notify visitors obtaining permits for backcountry use of the exact location of fire activity. Adjacent land management agencies and nearby residents would also be notified if any fire poses a possible threat outside the park.

MIST and best management practices not mentioned above that apply to reducing impacts to human health and safety include:

- Ensuring that safety is the first priority and primary concern of all firefighters
- Encouraging firefighters to routinely review and apply the 18 Watch Out Situations and 10 Standard Fire Orders during their incident tenure
- Posting lookouts
- Being cautious when felling or burning live or dead trees
- Not enabling wildlife accessibility to food
- Clarifying fire orders
- Maintaining adequate firefighter resources and following established work/rest guidelines
- Thoroughly analyzing fire behavior given predicted weather conditions
- Ensuring all required fire analyses are completed as required
- Wearing or using appropriate personal protective equipment (PPE)
- Using infrared devices to detect hot spots
- Aerial monitoring of fire
- Knowledge of terrain
- Well-trained staff

Impacts of smoke on public health would also occur, with negligible to minor impacts from small fires or suppression efforts and larger impacts when fires are more extensive or nearer populated areas, including when inversions hold smoke at lower elevations or air currents carry smoke down valley. Large or small fires could smolder for a few days to a few weeks or more. Smoke would be diluted to some degree by mixing and dispersion. The degree to which this would occur would depend on localized and regional weather patterns, topography and other factors.

Public information would be expanded when increased smoke management concerns are evident, enabling sensitive people to take appropriate measures to limit their exposure. Drift smoke from fires could affect area travel corridors, including park and other roads, resulting in reduced visibility for drivers, an increased need for traffic control and other effects.

A range of beneficial effects to park operations and visitor services could also result from the implementation of a sound fire management program. These would include better protection of park resources, including ecosystem processes, historic structures and administrative facilities. They would also include better training, including cross-training, of park staff, resulting in a better understanding of fire management and its importance to park resources, as well as skills that are readily transferable to other parks, agency and interagency fire management operations.

Backcountry Historic Structures and Utilities

The Park is encouraged to complete hazard fuel reduction around all backcountry historic structures and utilities before fire season.

If a fire is threatening a backcountry historic structure and/or utility, it will be evaluated and as long as conditions permit fire fighters to enter the area safely. An assessment will be completed and efforts will be made to preserve the area, with the Superintendents concurrence, in the most cost effective manner.

Socioeconomic

Each of the fire management strategies described herein would likely result in impacts to the local and regional economy, albeit regional economic effects would likely be indistinguishable in the absence of large catastrophic wildland fires. Firefighting, fire management operations and other aspects of the park fire management program described herein could result in a negligible to minor impact on area economies. The range of park operations that could result in local economic effects include the size of the fire management payroll, the amount of goods and services procured locally, and the impacts of fire operations and smoke or other fire effects on changing park visitation during localized or widespread fires.

Loss in tourism revenue could, in some cases, be compensated for by the presence of large wildland fires. This would be particularly true with respect to substituting revenues generated from wildland firefighting operations revenues typically generated by visitors (including meal preparation, the purchase of goods and services, and lodging). Similar impacts or benefits would result from the closure of park areas containing these concession services. And, the same is true of socioeconomic impacts related to park area, road or trail closures or widespread fire management activities.

Safety

The Incident Commander and on-scene personnel will take immediate steps necessary to secure the scene, protecting visitors, residents, non-incident employees and park resources. Assessment of safety issues (escape routes, safety zones and danger areas), origin and cause, size of the fire, length of the fire perimeter, location of the fire front, values threatened by the fire, weather conditions, fire behavior, fire intensity, fuel type, topography and time of day will be made.

Life threatening situations will be managed in the same manner as any other time critical emergency and will have priority over all other communications or fire actions.

Fast moving, high intensity fires may require evacuations. In these situations, the Incident Commander will coordinate the evacuation with the local LE agencies, Chief Ranger and FMO.

Small, low intensity fires may not pose any immediate threat to public safety, but action may be taken to promptly contact all staff and visitors in the fire area and to advise them of the fire situation, potential safety considerations, communication procedures and safe travel routes.

For long-term incidents, additional precautions may need to be undertaken to resolve heavy smoke impact upon local communities. Normally, under these situations, a fire team will be in place, and they will formulate a smoke impact mitigation plan for impacted local communities, if needed. Areas to consider during the formulation of this mitigation plan would include roads, schools, nursing homes, airports,

hospitals, and any high technology industries that may be located nearby. If the park staff is managing a fire that is having undo negative smoke impacts on a community or roadway, a park air quality advisor will be assigned to formulate and implement a smoke mitigation plan.

(See Fire Management Organization and Responsibilities and the Public Safety Plan).

V. WILDLAND FIRE MANAGEMENT

This section addresses the five primary components of wildland fire management:

- 1) wildland fire suppression,
- 2) wildland fire use for resource benefits,
- 3) fuels management,
- 4) hazardous fuel reduction and debris burning, and
- 5) prescribe fire.

As described in the accompanying Environmental Assessment, Mount Rainier's Fire Management program will use the following fire management strategies:

Wildland Fire Suppression, Wildland Fire Use For Resource Benefits, Prescribed Fire And Hazard Fuel Reduction (Manual/Mechanical Fuel Reduction and Debris Burning)

A. Wildland Fire Suppression Program

The following section describes specific components of the park's wildland fire suppression program, including:

- 1) Wildland Fire Prevention Program
- 2) Fire Weather Forecasting
- 3) Pre-suppression Preparedness
- 4) Pre-attack Preparedness
- 5) Step Up Plan
- 6) Fire Detection
- 7) Fire Reporting Guidelines
- 8) Mobilization Plan
- 9) Initial Public Safety Plan
- 10) Determination of Fire Potential/Decision Flow Chart
- 11) Fire Monitoring Guidelines
- 12) Suppression Conditions
- 13) MIST Guidelines
- 14) Burned Area Emergency Rehabilitation
- 15) Fire Investigation
- 16) Fire Funding
- 17) Fire Records and Reports

1. Wildland Fire Prevention Program

The plan includes specific actions that will be undertaken by responsible staff upon the increased incidence of human-caused fires and/or a high fire danger rating. The plan will be reviewed annually and updated as changes occur. See Appendix 27.

The Fire Prevention Plan includes:

- Information disseminated to visitors via bulletin boards, news media and personal contacts.
- Increased staffing and patrols during high fire danger.
- Potential restriction of visitor activities, such as banning/restricting frontcountry fires during very high or extreme fire danger.

Education emphasizes the need to inform the public of the importance of wildland fire prevention.

Activities will include:

- Pertinent signs, posters, and notices will be posted on park bulletin boards, and at visitor centers, developed campsites and day use sites, and neighboring resorts.

- Pertinent messages will be included in park publications, such as the park folder and newspaper, camping and hiking brochures, nature trail guides, on the park website, and a site bulletin describing wildland fire management program, and news releases to local and regional media.
- Pertinent messages will be included in visitor center exhibits, lightning caused wildland fires (not including those managed for resource benefit) interpretative talks, and NPS and concession orientations for new and returning employees.
- Pertinent messages will be included in informal contacts between concession/commercial use license employees and park visitors and neighbors.
- Programs at local schools will emphasize fire's natural role in the park ecosystem and the prevention of human-caused wildland fires.

Enforcement of rules and regulations pertaining to fire will be aggressively enforced. Burning restrictions are coordinated with the other agencies through the use of standardized regulations found in Section 41 of the MNICS Mobilization Guide. Other enforcement activities include:

- Wood fires will be restricted to metal fire grills at developed campsites and day use sites.
- Prior to the opening of fishing season in mid-May, Maintenance personnel will clear the area around each fire grill of encroaching vegetation, and branches overhanging fire grills will be limbed.
- Patrols by park rangers, particularly during the evening, will enforce compliance with the policy of restricting wood fires to developed sites and with any open burning restrictions that may be in effect due to high fire danger.
- Local power companies will check power lines for tree clearance and will correct deficiencies.
- Any restrictions deemed necessary during periods of extreme fire danger will be publicized on radio, television, and in local newspapers.
- The Park's contracted inspector will conduct formal annual fire/safety building inspections. The Chief Park Ranger and the Facility Manager will clear up any hazards identified during such inspections, as soon as possible.

2. Fire Weather Forecasting

Fire weather forecasting is an important component of park fire management. Local weather and fire danger information is combined with park information to produce a park forecast during the fire season (May 15 through October 30).

The National Fire Danger Rating System (NFDRS) indices and components are utilized and are computed through the Weather Information Management System (WIMS). A computer to access WIMS is maintained at the park Communications Center. Routine WIMS use is by Communications Center personnel under the direction of the FMO. Park fuel model and weather information is used to calculate the park fire danger rating.

Weather observations and situation reports are entered daily in accordance with published standards. The park maintains two fire weather stations. Two RAWs stations are to be installed in 2003. The Ohanapecosh station will be replaced and another RAWs will be placed in the Sunrise area.

<u>Location</u>	<u>Fuel Model</u>	<u>Station #</u>	<u>Elevation</u>
Kautz Creek	G2 P3	45-1812	2275
Ohanapecosh	H2 A3	45-1119	1925

Fire weather data includes:

Fire weather is recorded once daily between 1300 and 1400 hours, or more frequently as directed by the FMO. WIMS indices are calculated from the data collected for each of these stations. The NFDRS fuel models (C, G, H, T) and NFFL Fuel Models (2, 5, 8, and 10) are used for the calculations. Outputs of fire weather and fire danger are retrieved and relayed to the field over the park's network computer system. A radio bulletin is also transmitted to inform field units of current conditions when Staffing Class IV (See Step-Up Plan) or a red flag warning is in effect. The Puget Sound Interagency Communications Center is notified daily of fire conditions in the park. On occasion, the Northwest Interagency Communications Center is also notified. End of the month records are kept in Parks Communication Center.

There are two Remote Access Weather Stations (RAWS) located in the park, but there is a need to switch all weather stations to this system by 2004.

3. Pre-suppression Preparedness

The FMO will annually (between April 1st and May 1st) complete a Readiness Checklist, a Pre-Season Risk Analysis, and a Pre-Attack Planning and report their status to the Chief Ranger and Superintendent. All of these documents are found in the appendix.

The minimum initial attack staffing level (MC-I) specified in the Step-Up Plan for the park will be available during fire season. The Annual Fire Program Outline located in the appendix identifies actions to be taken on a month-by-month basis in the park.

The Park Communications Center will function as the initial fire information center until an expanded dispatch can be formed. Fire situations, fire danger, current staffing levels, and call-out information will be handled by the communication center. Fire personnel availability and resource orders will be maintained and organized by the ranger district clerk.

4. Pre-attack Preparedness

Pre-attack preparedness is to organize and assigning specific duties to park staff. These duties and responsibilities are generally outlined in the Fire Management Plan.

Currently, Mount Rainier does not have any qualified Type II section chiefs. We would rely on a local interagency IMT team to provide leadership if a moderate fire was to occur within the Park. See pre-attack planning checklist in Appendix 13

5. Step-Up Plan

As fire danger increases, actions outlined in the following Step-up Plan will be taken to enhance fire detection and preparedness. This plan is an interim measure and contains inputs of observed Burning Index based upon park records versus the frequency distributions and seasonal graph for BI, which are contained in the fire data printouts pages 21, 22, and 43.

Manning Class	BI (Fuel model G)
I	0 – 2.47
II	2.48 – 4.94
III	4.95 – 9.90
IV	9.91 – 11.87 (90%)
V	11.88 – up (97%)

STAFFING CLASS	Burning Index (BI) FUEL MODEL G	STEP-UP ACTION
Manning Class MC-I	0-10	Normal 5-day Tour of Duty (TOD) with no special provisions for firefighters on duty.
MC-II	11-19	Normal 5-day TOD with at least two firefighters available within 12 hour callback but not necessarily on duty.
MC-III	20-31	Normal 5-day TOD with one firefighter on duty and two firefighters available on 6-hour callback. If Lightning Activity Level (LAL) 4-5 is occurring, predicted for the day, or has occurred within the past 24 hours, or is a high visitor use period, move to MC-IV.
MC-IV	32-54	If LAL 3-6 has occurred within past 24-48 hours or old sleeper fires are being located around the park at lower elevations, a fixed-wing detection patrol and/or staffing of lookouts will be utilized. Potential for extended shifts on a day-to-day basis, a six day work week, mobile patrols and/or a engine working mid morning to dusk. Evaluate staffing the primary lookouts and/or coordinating with the USFS lookouts on the park's boundary.
MC-V	55-up	All of the actions under MC-IV. Open fires will be prohibited in concert with surrounding agencies (USFS, DNR). Area closures or other restrictions on visitor activities may be implemented. Potential for extended shifts on a day-to-day basis, a seven day work week, mobile patrols and/or two engine patrolling mid morning to dusk. Staff the primary lookouts and/or coordinating with the USFS lookouts on the park's boundary.

In the above plan, MC refers to Manning Class and BI fuel model refers to Burning Index.

Wildland Fire Suppression Program

6. Fire Detection

All personnel will report any detected fires to the Communications Center, giving the location based on the Uniform Map Grid System, legal land description, geographic description or other best method. Communications Center personnel will convert to township/range/section or latitude/longitude for reporting to PSICC, the Chief Ranger and/or the FMO.

Visitor fire reports will be reported to the Communications Center and confirmed by NPS personnel who are trained in detection of wildland fires.

Fire lookouts located on Gobblers Knob, Tolmie Peak, Mount Fremont and Shriner Peak may be staffed when the *National Fire Danger Rating System* (NFDRS) reading taken at Kautz Creek, Ohanapecosh, Enumclaw, or Packwood is HIGH or greater, and/or as per the *Step-Up Plan* (under MC-IV and MC-V). Each lookout has an operating Osborne Fire Finder. When staffed, radio communication with the Communication Center will be established and any fires detected will be reported using the *Wildland Fire Observation and Summary Fire Behavior Report* located in the appendix. All of the Fire Lookouts would need water flown in or delivered for extended assignments.

Secondary lookouts may be established at areas not covered by staffed lookouts or when staffing of lookouts cannot be coordinated. Portable fire finders and a tripod will be used for accurate bearings when possible.

The Department of Natural Resources and U.S. Forest Service over flights may observe sections of the park during periods of high fire danger. Detection of fires within the park are relayed from the observing agency dispatcher to the Communications Center and relayed to the FMO, area District ranger and the park Chief ranger.

Fixed-wing and helicopter equipment rental agreements or contracts will be kept current for detection and observation flights. The Office of Aircraft Services, Boise, Idaho, provides aircraft rental agreements for the Department of Interior. Resource orders will be placed through PSICC or NWICC.

7. Fire Reporting

Fires are reported to the park Communications Center and relayed to the FMO and responsible area ranger for action via radio or phone. Initial reporting information should include: person reporting the fire, location of fire, best access, landowner, estimated size, descriptive rate of spread, winds, suspected cause, and values threatened and resources at risk. Initial information regarding the incident is as outlined in the mobilization plan.

Initial attack on new wildfires is the responsibility of the FMO, under the direction of the Chief Ranger, following procedures outlined in the Mobilization Plan. The response to new lightning fires depends on the location of the fire and initial *Wildland Fire Implementation Plan (WFIP)*. The Mobilization Plan (below) outlines the steps followed to determine the threat from wildland fires and how to initiate the analysis process to determine whether the fire is a candidate for wildland fire 'use' classification.

A good size up is the first objective on a fire. All wildland fires controlled by suppression forces undergo initial attack. The number and type of resources responding to initial attack varies depending upon fire danger, fuel type, values at risk and other factors. Nationwide about 95 percent of all wildland fires never exceed the initial attack level of complexity (Type IV) (NWCG Handbook 3 1989).

Fire Qualifications

Qualifications for all wildland fire management positions shall conform to guidelines set forth in the *Wildland and Prescribed Fire Qualification System Guide*.

Fire qualifications are based on the National Interagency Fire Qualification System (NIFQS). All park fire assignments will be made on the basis of NIFQS qualification and ability as outlined in the Wildland Fire Qualification Subsystem Guide (PMS-310-1). Trainee assignments under the 310-1 system will be documented by the use of task books for the appropriate assignment. All park staff that are red-carded shall have their training and experience records maintained on the Wildland Fire Qualification and Certification System, which is, maintained and accessed through the NIFC SACS computer. Task Books for each fire position are available from NIFC. Documentation of completion of Task Books shall be maintained in the SACS computer and by the FMO.

Fire assignment policy is outlined in the Fire Mobilization Plan of this plan. Only personnel with current 310-1 qualifications will be dispatched to fires. Emergency firefighter personnel hired under AD rates must meet all of the training and physical fitness requirements for assignment to the fireline and must provide part of the required personal equipment (boots). Emergency hiring is subject to approval by the Fire Management Officer or the incident commander, and is strictly limited to actual emergency need. The Interagency Incident Business Management Handbook will be followed on all AD hiring.

8. Mobilization Plan & Communication

Upon discovery or report of a fire, all subsequent actions will be based on the following sequence.

After the Communications Center is informed of the fire by the individual or agency who discovers or receives the report of a fire, the Communications Center will immediately notify the FMO and appropriate area personnel.

If the fire is contained/extinguished immediately by reporting person(s) (such as abandoned campfires or beach log fires), the report to the fire management office may be followed up by a phone call (voice mail) or electronic mail. Information required for the report is located below. Natural and Cultural Resources will be notified of all fires not related to visitor use in developed areas and/or greater than 0.25 acres. If a known impact on threatened or endangered species or a cultural site has happened or may occur, immediate notification will be made to NCR, regardless of the size of the fire.

For any fire occurring during staffing class I and II (low fire danger), located near a road, the Communications Center/FMO will immediately dispatch the appropriate engine or a minimum of two firefighters and one squad boss to immediately size up the fire. A qualified ICT4 or ICT5 will be dispatched to the scene on any moving fires (non-abandoned campfire or beach log fire).

For fires occurring during staffing class III (moderate fire danger), the Communications Center will immediately notify the FMO, Chief Ranger and initiate dispatch of firefighting personnel, an ICT4 or ICT5 (whichever is warranted) and the closest NPS, USFS or DNR engine (if the fire is near a roadway). The WFIP would set the stage for whether the fire is suppressed or managed as a 'use' fire. The WFIP Stage I is the initial size-up of the fire and if the GO/No Go decision is for a 'use' fire then the ensuing Stages II and III would happen. If the fire is contained or not spreading, the closest park qualified staff or engine will be dispatched to size up the incident and report to the Communication Center.

During staffing class IV or higher (high or extreme fire danger) fires, appropriate firefighters, an ICT4 and the closest NPS, USFS, DNR or fire district engine will be dispatched (if the fire is near a roadway). Consideration of automatic dispatch of a helicopter with bucket, a qualified helicopter manager and air tanker support, as well as additional ground support from adjoining areas will depend on fire location, and if structures are threatened, initial and predicted fire spread, and fire weather.

If the fire is a naturally occurring backcountry fire, FMU-2, then the fire office will execute the Wildland Fire Management Policy Flowchart to determine the appropriate management response if the fire is within FMU II. The course of action will be according to the decision tree. Initial size up should be completed by an ICT4 or higher qualified individual.

The FMO/Incident Commander will initiate Stage I of the *Wildland Fire Implementation Plan*. The FMO will assign the fire name, fire number and determine jurisdiction of the fire. The FMO will be responsible for completion of current and predicted fire weather information and relay this information to the Incident Commander as soon as the weather information is known. The FMO/Duty Officer will also be responsible for determining available firefighting resources.

The initial attack Incident Commander will ensure that the following is determined and relayed to FMO/Communications Center:

- Current Size
- Fire location - Latitude and longitude or azimuth and distance from known landmarks; elevation.
- Cause - Human or lightning (if a human caused fire, protect the fire scene for possible arson or intent)
- Fuel Model/Conditions – to include fuel loading
- Fire behavior and potential - Size-up information: Fuels, topography and on site weather data to permit prediction of fire behavior, size and complexity.
- Fuel type(s) and characteristics.
- Position of fire on slope and percent slope.
- Aspect (south facing, west facing, etc.)
- State of weather (rain, clear, etc).
- Temperature.
- Relative humidity.
- Wind speed and direction.
- Characteristics of smoke column (black, light gray, white)
- Observed fire behavior.
- Estimated fire size.
- Determine fire potential based on fire behavior and predicted weather.
- Request additional resource needs (personnel, helicopter or airtanker support), through the fire office. Helicopters may be procured through local contacts by the fire office and procurer, while medium helicopters and airtankers must be ordered through the Puget Sound Interagency Communications Center (PSICC) or Northwest ICC.
- Threat to public safety: proximity of visitors, residents or non-incident employees in the immediate fire area and the degree of risk to such persons from the current fire situation.

If the fire exceeds class B size (greater than 50 acres) or the park's capability to manage, it is suggested that the management of the fire be turned over an Incident Management Team (IMT) of a size and capability commensurate to the complexity of the wildland fire. The FMO will ensure a qualified Incident Commander and fire organization commensurate to the complexity/potential of the fire is brought together to manage the fire.

Communications

The park Communications Center at Tahoma Woods (park headquarters) is the dispatch center for the park. During the fire season the Communications Center is normally staffed 14-16 hours each day. Telephone callers reporting fires may contact either Communications Center personnel or park rangers after normal business hours via the 911 phone system.

The park radio system consists of base stations at the Communications Center at Tahoma Woods, Longmire, Crystal Mountain and Paradise with repeaters and remote units at various locations. All ranger stations in areas accessible by paved road have phone lines. Radio repeaters are located on Gobblers Knob, Crystal Mountain, Mt. Fremont, Tolmie Peak, Shriner Peak and Packwood. Any fixed

base radio unit in the park and most mobile units can be contacted by the Communications Center's fire dispatcher.

All fires will be reported to the Communications Center. Dispatch personnel will maintain a radio log of fire activities on ICS form 214 Unit Log. When a fire occurs a daily situation report, 209, will be faxed to PSICC daily by 1800 hours. Fire weather data will be transmitted to PSICC as weather data is collected from Kautz and the Ohanapecosh fire weather stations.

When a fire occurs in the park and the Communications Center is advised of its presence, personnel will first advise the park FMO. The FMO and District Ranger, within whose area the fire is burning, will have the Communication Center contact an Incident Commander Type III or IV, a Crew Boss and necessary resources to manage the incident and lead the initial attack and/or monitoring. When possible, a fire will be reconnoitered by air prior to personnel arriving on the fire.

If a fire has occurred outside the park and park firefighters are asked to assist, the Communications Center will notify those persons designated on the current weekly PSICC resource list by their supervisors and reviewed by the FMO.

Supervisors of the personnel dispatched outside the park, will be notified by email or voice mail, by their employee, not by the park Communications Center. With a request on an "initial attack" fire moving into the park from an adjacent landowner, the Communication Center may contact any qualified fire fighter on the Park's overall list as the closest forces to assist with immediate suppression.

9. Initial Public Safety Plan

All fire management activities will be performed in strict adherence to National Park Service safety standards, including auxiliary functions in logistical and administrative support. The guidelines located in Directors Orders 18, under the heading of Program Requirements, Safety and Health are reproduced below and will be considered the minimum standards under which all activities outlined in this plan will be performed.

1. Firefighter and public safety is the first priority in all fire management activities.
2. Fire personnel will meet appropriate qualifications for incident assignments, including medical requirements.
3. Fire personnel will be equipped with personal protective equipment appropriate to their incident assignments.
4. Fire personnel, including cooperators, will comply with National Wildfire Coordinating Group (NWCG) and NPS fitness and personal protective equipment standards while assigned to fire incidents. Mutual aid cooperators, responding to NPS fires under Memoranda of Agreement, will meet their respective personal protective equipment and qualification standards during initial action operations. However, during project fire or extended operations, cooperators will meet NWCG equipment and qualifications standards.
5. Fire personnel assigned to fireline operations will complete a minimum of 32 hours of basic wildland fire training, and then annually a minimum of 8 hours of refresher safety training prior to incident assignments.
6. No "live fire" shelter training exercises will be conducted or condoned by the NPS.
7. All wildland fire incidents that result in human entrapment, fatalities, or serious injuries or result in incidents with potential for the above (see RM-18 for definition), will be reported and investigated. Pending initial assessment, those directly involved in the event to be investigated will be removed from fireline duties as soon as practical, and will be made available for interview by the investigation team. Peer Support and/or Critical Incident Stress Debriefings (CISD) will be provided as needed for any individuals. The CISD sessions provided will follow the MORA office order. Appropriate administrative actions will be taken subsequent to a full investigation.
8. All safety standards and guidelines identified within the Interagency Incident Business Management Handbook will be followed.

9. Management of all wildland fire incidents will comply with interagency risk management strategies.
10. The Job Hazard Analysis process will be used for potentially hazardous fire management activities, and for jobs, which require employee use of out-of-the-ordinary personal protective equipment. See Reference Manual 18 for Job Hazard Analysis process and format.

In addition, particular attention will be given during transportation of personnel in vehicles and aircraft.

1. Drivers of vehicles will observe all traffic signals, speed limits and safety rules when traveling to and from a fire. The use of red lights and sirens is prohibited while responding to a wildland fire, unless there is a threat to life or structures and then the use of these emergency vehicles warning devices will be in compliance with Directors Orders 9 and 18. Drivers will be properly licensed for the size class vehicle they are driving.
2. The Incident Commander or Helibase manager will insure that personal protective equipment and clothing is available and worn by all personnel while working on a wildland fire or being transported in aircraft in accordance with agency policy and OAS regulations. Further information on aircraft operations is located in the park's Aviation Management Plan, the Interagency Helicopter Operations Guide (IHOG) and the Departmental Aviation Manuals.

10. Determination of Wildland Fire Potential/Decision Flow Chart

When lightning fires do not require immediate suppression, the following decision flowchart will be used. Until then, such fires will be conservatively managed for potential resource benefit until an individual *Wildland Fire Situation Analysis* (WFSA) and *Wildland Fire Implementation Plan* (WFIP) can be completed and approved.

The FMO will complete the WFSA with input from dispatched personnel, the Chief Ranger and resource advisors and IDT team. They will develop a proposed course of action based on the following sequence:

1. Consider the planning criteria (time, location, topography, fuels, etc.) and *Wildland Fire Use Unit* prescriptions.
2. Using the information gathered by dispatched personnel and *National Fire Danger Rating System* (NFDRS) indices, complete a *Wildland Fire Implementation Plan* (WFIP) selecting the appropriate management response for the fire. A full explanation of the WFIP is located in the Appendix.
3. Plot predicted fire spread for an appropriate projection time (minimum of one burning period) on topographic maps featuring an overlay of the Fire Management Unit boundaries and location of values-at-risk (structures, administrative facilities, etc.). A copy of this map will be attached to the WFSA.
4. Estimate maximum fire potential, fire behavior and predicted weather forecast, selecting the appropriate management response for the fire.
5. Forward the completed WFSA to the Chief Ranger and Superintendent's staff for review. Final approval is by the Superintendent or designee or the IC of the Incident Management Team.

11. Suppression Conditions

A map of the area can be viewed by linking to the web:

[Slope](#)
[Specimen Trees](#)

Fires are reported to the Communications Center and relayed to the FMO and appropriate personnel for action in accordance with provisions of the *Mobilization Plan*. This plan is reviewed and revised annually to ensure compliance with the mobilization procedures of surrounding cooperating agencies and the interagency mobilization guide prepared by the Puget Sound (PSICC) or Northwest Interagency Coordination Center (NWICC).

Personnel and equipment must be efficiently organized to suppress wildland fires effectively and safely. The FMO assumes a coordinator and/or incident commander function on major fires (Class C, 100 acres, or greater in size) or multiple fire situations (four or more Class A/B incidents), by setting priorities for the use of available resources and establishing an appropriate ICS organization for each incident. In the event that the FMO is out of the park, the Chief Ranger will assign an appropriate level Incident Commander to the incident or order the appropriate resources or fire team.

Some wildland fires may involve criminal activity. The Chief Ranger will be promptly notified by the FMO of incidents where determination of fire cause and liability should be initiated. LE investigation by a qualified arson investigator is recommended. Reference should be made to the *Fire Investigation* section (below).

FIRE SUPPRESSION CONDITIONS

Heavy fuels, rotten old growth snags, steep topography, difficult cross-country travel and logistical support problems increase the difficulty of suppressing wildland fires in Mount Rainier National Park. Ground forces with hand tools and air attack support are the primary suppression methods.

As described herein, limitations have been placed on the types of mechanized equipment, that may be used in the wilderness. See *Minimum Impact Suppression Tactics* (below and in Appendix 23).

On most wildland fires, direct attack using hand tools is the most effective containment method. However, fires, which escape initial attack, can create fire intensity levels too hazardous for direct attack, especially when heavy fuels on steep, rocky slopes hamper fireline construction. Indirect tactics or air attack is then utilized.

Water sources can be locally abundant and portable pumps and/or gravity socks with large progressive hose lays may be used in lieu of or to supplement constructed firelines. On front country roadside fires, engines are utilized whenever possible during initial attack. Park engines are designed to supply water and wet-water or high-expansion, environmentally friendly foam. Backcountry fires may involve helicopter support. Helicopter bucket drops and sling operations are sometimes required for suppression action, as ground access is limited. On some fires, aircraft may perform the majority of the suppression action. Air tanker drops of various short-term fire retardant are often effective in limiting fire spread during initial and extended attack.

Fireline explosives can be a rapid and effective method to construct minimum width firelines while overall minimizing environmental damage and exposure of personnel to hazards of terrain. Specially trained fireline explosives crews may be obtained from PSICC. If explosives are to be used, emergency consultation may be required, if there is a potential to impact rare, threatened or endangered species.

Natural fire barriers are often available as anchor points and may also be utilized with or without improvements as indirect firelines. Hazardous conditions can be created, however, when large amounts of fuel are left in unburned "islands" between the fire and indirect firelines. Burn out may be difficult and slow because of the heavy fuel loading and may increase the potential hazard. Cold-trailing, whenever and wherever possible, is preferred.

The best opportunities for containment occur on either end of the burning period. Fireline construction is usually not possible at night due to the terrain and the extensive chainsaw work required in these fuel types. Night shift activities are usually limited to patrol and holding activities, due to the danger associated with falling snags and the normally steep and hazardous terrain.

Complete mop-up can be critical in park fuel types and should be methodically planned and executed. Fires can burn deep into the heavy duff. Large, smoldering snags and windfalls may have to be felled or bucked to insure safety and complete extinguishment of the fire. Re-burn following containment to the

extent that firelines are threatened, is rare. The usual precautions for line construction, holding and mop-up as with other western timber fuel types are recommended.

12. Minimum Impact Suppression Tactics (MIST)

The *Wilderness Act* defines Wilderness as an area “without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which...generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable . . .” The goal of MIST is to minimize fire suppression impacts on the land while ensuring the fire management actions taken are safe, timely and effective. Strategies for suppression activities and tactical operations will be planned to have the least long-term impact to the resource.

The MIST Implementation Checklist Guideline is found in the Appendix.

All fire management activities within wilderness will therefore adhere to Minimum Impact Suppression Tactics (MIST), national and park aviation policies, and Burned Area Emergency Rehabilitation (BAER) guidelines. BAER guidelines include emergency treatments that are required immediately post-fire to prevent loss of life and/or property and reduce potential negative impacts to critical resources as a result of fire effects or the suppression of the fire. Therefore, the appropriate management response to naturally occurring fires in the wilderness will be to monitor and take other necessary contingency actions based on protection and fire use objectives. Structures within wilderness having historical value or administrative need will be evaluated and assigned an appropriate level of protection.

MIST and best management practices not mentioned above that apply to reducing impacts to human health and safety include:

- Ensuring that safety is the first priority and primary concern of all firefighters;
- Encouraging firefighters to routinely review and apply the 18 Watch Out Situations and 10 Standard Fire Orders during their incident tenure;
- Posting lookouts;
- Being cautious when felling or burning live or dead trees;
- Not enabling wildlife accessibility to food;
- Clarifying fire orders;
- Maintaining adequate firefighter resources and following established work/rest guidelines;
- Thoroughly analyzing fire behavior given predicted weather conditions;
- Ensuring all required fire analyses are completed as required;
- Wearing or using appropriate personal protective equipment (PPE);
- Using infrared devices to detect hot spots;
- Aerial monitoring of fire;
- Knowledge of terrain;
- Well-trained staff.

As appropriate, the following analyses will be used to upon determination of an appropriate management response that involves wildland fire suppression, wildland fire use or prescribed fire use in wilderness: Minimum Tool Analysis and Helicopter Use Request found in the appendix.

13. Burned Area Emergency Rehabilitation

On April 27, 1998, the Department of the Interior approved new policies for Burned Area Emergency Rehabilitation (BAER), that provide funding for mitigating a broad range of threats to natural and cultural resources, and that minimize threats to life and property as the result of actions related to managing an unplanned wildland fire.

Rehabilitation will not be performed on unsuppressed natural wildland fires where the preservation of natural features and the natural process is paramount. Where suppression actions have been taken, however, rehabilitation is sometimes appropriate.

Every effort will be made to prevent human-caused impacts during a suppression effort through careful planning and supervision, individual education and commitment, the use of minimum impact suppression techniques, and a concerted effort to preserve the wilderness character of the fire area (See MIST Implementation Guideline in Appendix).

When rehabilitation is necessary, efforts will be initiated by the Incident Commander while the fire is being suppressed and through mop-up. If performed after the incident, the Chief Ranger and NCR Chief will designate an employee, usually the park Plant Ecologist, to organize and direct rehab efforts following Burned Area Emergency Rehabilitation (BAER) standards directed toward minimizing or eliminating the adverse effects of the suppression effort with a special emphasis at preventing unacceptable soil erosion.

If re-vegetation or seeding is required, only native plant species will be utilized and the park Plant Ecologist will be consulted. Re-vegetation requires the prior written approval of the Regional Director, per NPS-18 (III: Chapter 8: p. 7).

Rehabilitation planning for each fire will be the responsibility of the Incident Commander in consultation with the resource advisor. Rehabilitation should be performed prior to complete demobilization. Only under unusual situations should rehabilitation be put off until the following spring.

14. Fire Investigation

The initial attack Incident Commander or initial LE Rangers in developed areas will protect the probable point of origin of all wildland fires and record pertinent information required determining fire cause. The IC will be alert for possible evidence, protect the scene and report any findings to the FMO. The FMO will promptly notify the Chief Ranger of all fires of unknown or suspicious origin, which require follow-up investigation.

Prompt and efficient investigation of all suspicious fires will be carried out. Fire management personnel, however, should not question suspects or pursue the preliminary fire investigation unless they hold a current law enforcement commission. Information gathered will be documented in the Case Incident or Criminal Case Incident Record.

If the park does not have a qualified investigator available, personnel of other agencies may be utilized to investigate wildfire arson or wildfire incidents involving structures or order through PSICC. The Chief Ranger, FMO and other staff as appropriate will coordinate investigations.

15. Fire Funding & Records

Mount Rainier is not a fire-pro funded Park. We receive limited funding for fire preparedness. Emergency fire suppression funds will be requested through the FMO as needed. The FMO or Budget Assistant will request an account number from the regional office, and notify necessary park staff of the account number to use.

All costs for monitoring unplanned and uncontrolled ignitions will come from base funding (FIREPRO or ONPS) or from emergency preparedness funds in accordance with guidelines found in NPS-18.

Fire Report Records

Each fire will be reported immediately to the Superintendent by name, location and size. An ICS-209 status report (Appendix 29) will be accomplished daily for extended fire situations. A *Wildland Fire Implementation Plan* will be prepared for all wildland fires used for resource benefit and all prescribed fires. Reports will be submitted to and/or signed by the Superintendent daily.

A complete accountability of fire costs will be maintained for each fire.

All wildland fires (natural and human ignited, natural out, and/or false alarms, monitored or suppressed), and resources dispatched to other agencies in support of wildland fire activities, will be documented an *Individual Fire Report*, DI-1202 found in the appendix.

Individual Fire Reports will be submitted to the FMO within 48 hours after the fire is declared out or the resource returns to the park. Within 10 days individual fire reports will be entered into the NPS *Wildland Fire Computer System* (SACS).

A Case/Incident Record (Form 10-343) will be completed, with necessary attachments, to thoroughly document the fire and associated activities, if fire activities cannot be adequately documented on the space available on the DI-1202.

A wildland fire implementation Plan, (WFIP) Stage I is prepared for all fires. A wildland fire situation analysis (WFSA) is prepared for wildland fires that have escaped initial attack suppression 'control' actions. The situation must be critically analyzed. The current fire activity should be accurately described at least once daily in the *Daily Fire Assessment*. The format and instructions of the WFSA is located in the appendix. The WFSA will be prepared by the park for the incident management team and will be part of the Incident Management Team Briefing, a team briefing sample is found in the appendix.

All of the fire information from each sections (Ops, Plans, Log, Finance) should be in the final fire packet accumulated by the outgoing fire team. A short narrative or summary of the fire's major significant incidents should be included in the fire packet. Maps, news releases, IAP's, other pertinent information should also be in the final packet presented back to the Park, at close-out.

VI. Wildland Fire Use Program

A. DESCRIPTION

Naturally ignited wildland fires are those wildland fires that may contribute to the attainment of resource management objectives. Historical records and research indicate fire has played an important part in the maintenance of the diverse ecosystems of the park. Research further confirms that even small fires routinely experienced in the park play a significant role in diversity of meadow vegetation.

Natural Wildland fires require specific prescriptions that delineate the conditions under which the fires would be allowed to burn (See FMU descriptions). All fires not meeting the prescription or threatening human life, property, cultural resources, threatened or endangered species, including their habitat or recovery plans, as well as those fires threatening to escape over the park boundary, except where a General Agreement exists with another land management agency, will be classified as wildland fires and appropriately suppressed.

Within Mount Rainier National Park, certain lightning fires may qualify as wildland fires for resource benefit. These fires will be managed under the wildland fire for resource benefits strategy. Under this strategy, the management goal is to permit natural fires of all intensities to burn, subject to management constraints (including appropriate prescriptions). This will likely result in numerous small fires and occasionally large, high-intensity fires. Virtually any lightning fire in the Wildland Fire Use FMU may be considered suitable as a wildland fire for resource benefits. The fire, however, must meet the following criteria before being enabled to burn:

- It must help meet the park's pre-defined wilderness and resource management objectives; and
- It must be within the predetermined geographic boundaries of the Wildland Fire Use FMU-2; and
- It must fall into a pre-determined prescription.

Fires that do not meet these criteria will be managed under a suppression strategy. To determine the appropriate management response, a *Wildland Fire Situation Analysis* and *Wildland Fire Implementation Plan* will be completed. Both of these documents are located in the appendix.

The objectives for the use of wildland fire were described above under Section IV: *Scope of Wildland Fire Management Program*.

B. DECISION-MAKING AND MONITORING

Decisions regarding wildland fire use will be made based on specific criteria, including the time of year, the location of ignition, the expected weather conditions, the possibility of escape across the park boundary, smoke and health concerns and other criteria as described below. The factors influencing the decision to use or not use wildland fire will be monitored as follows (see also earlier sections on weather stations and monitoring):

The generalized decision process is based on the *Policy Implementation Procedures Reference Guide*. Information in the following paragraphs describes the actions necessary to safely manage wildland fires while considering resource and other values to be protected. The decision process to evaluate each new fire and assess ongoing wildland fires includes the following elements:

- Determine fire origin, location and cause
- Determine affected FMU
- Obtain current and predicted weather
- Determine immediate threats to life and property
- Consider smoke and health concerns
- Determine if necessary qualified personnel and fire management resources are available
- Is qualified manager for the fire available

- What are immediate and potential impacts to visitor use and local communities
- What is the projected fire growth under normal and drought conditions

Ultimate responsibility for all wildland fire management activity rests with the Superintendent of Mount Rainier National Park. For operational issues, the Fire Program manager is responsible for implementation.

C. FMU 2— Wildland Fire Use Unit

The purpose of the wildland fire use unit is to encourage fire as a natural disturbance that results in a landscape mosaic of varying species composition and structure. Dependent on variable analysis at the time of fire occurrence, naturally ignited wildland fires will be allowed to burn and be monitored for resource benefit. As with the Suppression Unit, all human-caused fires would be immediately suppressed. In addition, similar to the Suppression Unit, prescribed fire and hazard fuel reduction strategies would be used to sustain a natural fire regime.

Strategies

- Manage the FMU to maximize wildland fire presence to the fullest extent possible while protecting values at risk. This is completed through a WFIP, wildland fire implementation plan, stages I-III.
- All unwanted wildland fires would be contained, controlled and suppressed using the appropriate fire suppression response options.
- All naturally occurring fires within this unit would be reviewed for appropriate classification and management response. A WFSA would be completed for each ignition that escapes initial control suppression tactics. The fire-by-fire analysis and decision process gives managers a range of alternatives.
- Some fires may need to be suppressed, while others may only be managed on a specified flank to limit spread into a certain area. Fires not suppressed and allowed to play out a natural role in the environment will be monitored daily to gain knowledge and data on fire behavior and ecological effects, as well as to keep a close watch on fire activity. Fires in a “use” strategy would have the WFIP as a daily update process that validates the “use” fire is within its projected measures. If a natural wildland fire exceeds the prescription at any time it shall be declared a wildfire and appropriately suppressed.
- Where necessary to meet fuel reduction objectives, approved fuels management techniques, including prescribed fire would be used to reduce localized fuel concentration to a more natural range.

C. Management Considerations to Operational Implementation

- This FMU-2 is primarily comprised of wilderness.
- A number of backcountry historic buildings, including four fire lookouts, eight cabins, and three shelters, as well as more than 50 historic structures are part of the National Historic Landmark District and are included in this FMU. The historic structures include bridges, overlooks, culverts, tunnels, roads, trails, monuments and dams.
- This FMU includes minor developed areas such as Mowich Lake, Carbon River Entrance, Ipsut Creek Campground, Reflection Lakes, Tipsoo Lake, Box Canyon, Narada Falls, Ricksecker Loop Road, etc.
- Potable and non-potable water delivery systems, as well as other park utility systems, that service park developed areas are included in this unit.
- The islands of park developed areas that comprise FMU – 1, the Suppression Zone, are encompassed by this FMU.
- There are several major roads that access various portions of this Zone; however, most access is via trail.
- There are a number of known and unknown rare, threatened and endangered species issues in this FMU.

Physical and Biotic Characteristics

Elevations range from 1,600 feet to 14,410 feet. The area above 7,000 feet, however, is primarily snow, rock and ice and is of little concern from a wildfire perspective. Topography ranges from low elevation river valleys to alpine areas, containing deep valleys and numerous peaks. Nine major rivers cut through or border this zone. Annual precipitation may be up to and over 100 inches, falling primarily as rain below 5,500 feet and as snow above. Historically, the highest incidence of recorded lightning fires has occurred in this unit between 4,500 and 5,500 feet.

This FMU includes a broad range of low and high elevation forest and subalpine community types, including the Western Hemlock, Mountain Hemlock, Pacific Silver Fir, Subalpine Fir, and Alpine generalized vegetation types. Specific characteristics are described under each FMSU below.

Access to FMU – 2 is provided by State Highways 123 and 410, the Westside Road, Nisqually to Paradise Road, Stevens Canyon Road, White River-Sunrise Road, Carbon River Road, and the Mowich Lake Road but would primarily be accessed via designated trails and cross-country travel.

E. POTENTIAL IMPACTS OF FIRE PLAN IMPLEMENTATION

Park operations and visitor services

There would be a wide range of impacts to park operations and visitor services. Under fire use management scenarios, these impacts would include changes in visitor services, redirection in park operations and potential human health and safety impacts.

For the most part, park fire operations are funded out of national sources and do not result in major impacts on park operations budgets. Although there would be some opportunity to “backfill” positions, for instance, where firefighters were called out of the park for long periods, many short-term call-outs would be absorbed by park operations. This could result in fewer staff available to manage a variety of park operations during periods of high national alert or extensive park fire management operations. Firefighters come from the within the organization as a whole, including administration, maintenance, law enforcement, resources, and interpretation staff. Trained firefighters are available to park, agency and interagency operations. During periods of high national alert or extensive park fire management operations, there could be fewer staff in visitor centers, reduced visitor center operations, cancellations in interpretive programs such as walks and talks, fewer patrols of park campgrounds, and other effects on visitor services.

These impacts would be partially compensated for by the provision of increased fire information to visitors, the media and park staff. As appropriate, major and minor park developed areas, such as Longmire, Paradise, Carbon River, Ohanapecosh and others would be used to stage fire operations, including personnel, fire camps, etc. In localized fire management efforts, portions of park campgrounds, even whole campgrounds, could be closed to visitor use, to provide for public safety or to facilitate fire suppression efforts.

As a result, there could be a wide range of reduced visitor services, including negligible to moderate trail, road and area closures that would have concurrent changes in visitor services as well. These could result in loss of concession revenue, interruptions in scientific studies, and changes in the way park visitors would access services and facilities. Loss of concession revenue would be compensated for (to the degree possible) by increased use of concession facilities to stage fire management operations out of.

Closures in visitor use of these facilities would be limited to the degree possible since the experiences they provide would be protected in a similar manner to sensitive park resources and facilities. Increased air operations for fire monitoring or suppression or evacuations would result in increased noise and activity and could increase safety hazards for visitors and employees.

E. PUBLIC SAFETY ISSUES AND PROCEDURES

Managing a total fire program is among the highest risk operations that any land management agency can undertake. The first priority consideration in any fire management action is firefighter and public safety. Safety of visitors, employees, families, and incident personnel will be the number one responsibility given to Type IV or Type III Incident Commanders, or Incident Management Teams.

Creation of defensible space as a safety-related action requires careful planning along with prudent applications of mechanical fuel reduction and debris burning. The same can be said for the fuels management program on agency wildlands where firefighter safety may be compromised during severity years when resistance to control is high to extreme.

Safety Issues and Concerns

- Conditions that pose an immediate threat to human life.
Hazardous fuels accumulations around developed sites and visitor-use areas, combined with steep slopes, narrow access roads, and distance from mutual aid resources constitute a continuing threat to residents, visitors, and employees.
- Management of wildland fires and prescribed fires is becoming increasingly hazardous. Minimizing personnel exposure to hazards associated with suppression and other fire management operations requires training, effective communications, and on-site hazard analysis and mitigation measures.

Mitigating Actions

The following program elements will be followed, with the intention of mitigating concerns stated above.

- ♦ Fire personnel, including cooperators, will comply with NWCG and NPS personal protective equipment standards while assigned to fire incidents. Mutual aid cooperators, responding to NPS fires under a General Agreement or Memoranda of Understanding, will meet their respective personal protective equipment and qualification standards during initial action operations. However, during project fire or extended operations, cooperators will meet NWCG equipment and qualifications standards.
- ♦ No "live fire" shelter training exercises will be conducted or condoned within the NPS.
- ♦ All wildland fire incidents which result in entrapment, injuries or fatalities, or the potential for injury or fatality, will be reported and investigated and appropriate administrative follow up actions taken
- ♦ Implement, or continue implementation, of approved project-level plans designed to create fuels conditions that support defensible space and public safety protection objectives in the park
- All fire personnel shall meet appropriate qualifications, including physical fitness and medical requirements, for all fire assignments (per NPS *RM-18*, *DO-18* and BLM *Standards for Fire and Aviation*);
- Fire personnel shall be equipped with personal protective equipment appropriate to their incident assignments;
- All fire personnel and cooperators will comply with NPS fitness and personal protective equipment standards while assigned to fire incidents except for initial action by mutual aid cooperators;
- All safety standards and guidelines identified within the Interagency Incident Business Management Handbook and SWA guidelines will be followed; All wildland fire incidents will comply with interagency risk management standards.

G. Public Information and Interpretation

Public education and interpretation about fire ecology and National Park Service fire management issues are/will be provided in a variety of ways at Mount Rainier National Park. Although not identified as a primary interpretive theme at Mount Rainier, fire ecology is considered a secondary theme and is incorporated in interpretive programs, the park's education program, in publications and the park's website. Although Mount Rainier's typically heavy rain and snowfall prevent a heavily fire-reliant ecosystem, varying precipitation levels combined with heavy fuel loads have the potential to greatly increase fire danger during drought years. This is an especially important service-wide topic in light of recent high profile fires such as Cerro Grande (Bandelier NM) and the Outlet Fire (Grand Canyon) which have had tremendous influence on NPS fire management policy.

Fire ecology, both locally and nationally, will be incorporated into the park's developing education program. Students will learn about fire ecology and its importance in ecosystems, as well as learn how the National Park Service develops programs and policies, adapting and changing them to incorporate new scientific and experiential information. Fire related jobs in the National Park Service will be a part of the National Park Service career education curriculum being developed. In years of increased fire danger, there will be a greater emphasis on fire education. For example, in the spring of 2001 programs were presented on the National Park Service and Mount Rainier National Park fire management programs to schools studying fire this year because of the drought conditions and high fire danger throughout the state. Students researched fire, performed community service projects in their area, assisted local homeowners and citizens by clearing fire buffer zones around their homes, and educated their families and community members about fire safety. We will continue to take advantage of such opportunities through our developing education program in local and regional schools.

Interpretive programs, including walks, talks, and evening programs, include fire ecology in virtually any in-depth discussion of forest ecology, and this will continue. We will continue to take advantage of materials being developed by parks with more active fire programs and incorporate them into our interpretive training and public education efforts.

If funding is provided, a web site will be developed which will include information about the role of fire in Mount Rainier's ecology, and web updates will be provided regularly with current information any time a fire is burning in the park. Links will be provided to sites with more in-depth fire information, such as Firewise.

The park's Long Range Interpretive Plan (June, 2002) calls for a potential exhibit on fire ecology at the Mount Fremont Fire Lookout, a popular day hike to a historic fire lookout. Additional opportunities for incorporating fire ecology into interpretive exhibits as they are developed will be evaluated.

The objective of fire information/education program is to provide the public and employees with information concerning fire management goals for the park and to prevent human caused fires. Public education must be a continuing process to allow for acceptance of natural wildland fires and the role of lightning-caused fires in the ecosystem.

The goal is to obtain support from the public by providing accurate and timely information about the Fire Management Plan and fire management decisions which affect the park environment. To continue this effort, the following measures will be implemented:

The park information radio frequency (1610 AM) heard at entrance stations and Paradise will be used to inform park visitors of any significant fire activity or smoke that may impact their visit to the park.

Information explaining fire management programs will be incorporated into interpretive programs, exhibits, videos and nature walks as they are developed by the fire management office, or the Branch of Wildland Fire and Aviation. The pamphlet "Wildland Fire in National Parks", developed by NPS-

NIFC, will be made available to the public during high fire danger or when there are active fires burning in the park.

Articles for the summer addition of the park's visitor guide for Mount Rainier, the "Tahoma News" explaining fire management policies may be developed and made available for distribution.

To facilitate information dissemination on a regional and national level, PSICC, CCSO and NPS, Branch of Fire Management at the National Interagency Fire Center will receive situation reports of all wildland fire activity at Mount Rainier National Park.

The following chart lists responsible parties and specific actions with dates for completion for fire-related activities at the park.

ACTION	RESPONSIBLE PARTY	<u>DUE DATE</u>
Contact local news agencies.	Public Information Officer (PIO)	by June 1
Contact adjacent communities to explain the FMP	PIO Interpretation, and Rangers	continuous
Contact local news agencies and agency personnel when a fire is being managed under this plan.	PIO	as needed
Initiate direct mailings to key groups. Conduct informational training for park, interpreters, receptionists and other information personnel.	PIO, Interpretation, and Rangers	by June 1
Obtain signs for placement at appropriate locations for ongoing fires.	Interpretation, LE Rangers	by June 1
Post signs at trailheads as needed when a fire is burning.	Interpretation and L.E./backcountry rangers	as needed
Initiate a post-season news release	PIO	by Nov 30
Contact surrounding National Forests in preseason to explain program.	Ranger Division	by June
Contact neighboring agency at ignition for information and input.	Comm Center	as needed
Educate concessionaires.	Interpretation	preseason
Contact Regional Office and PSICC when fires occur.	Comm Center	as needed

NEWS RELEASES

Mount Rainier NP does not have a dedicated Information Officer, the Chief of Interpretation serve as the Park's public affairs liaison. Maps, narrative statements and photographs of the current fire situation and fire danger ratings will be posted in area ranger stations and visitor centers.

All verbal and written news releases will be made by the Office of the Superintendent unless delegated to an Incident Management team. The Regional Office will be kept informed of all fires and fire management activities daily. Fire situations will also be reported to surrounding public and private land management agencies.

INTERPRETIVE PLAN

On-site visitor interpretive assistance should be initiated on all large fires, which occur near populated or developed areas. A pamphlet, "Fire: in Pacific Northwest National Parks" is available for distribution.

Fire records, photographs, etc., are important to the fire management, interpretive and research programs, and will be collected and filed. Public reactions to fire management activities and interviews will be recorded and made part of the fire record.

H. RECORDS AND DOCUMENTATION FOR FINAL PACKET

This is a standard outline of contents for permanent project record for each wildland fire use application.

- a. approved planning document
- b. monitoring reports/findings summaries
- c. revalidation/certification documents
- d. funding codes/cost accounting
- e. project maps
- f. other info (photo points)
- g. funding/fiscal tracking

Quality, long term documentation records for all actions taken on a wildland fire is critical. The following guidelines will be followed:

All decision documents, monitoring data, supporting documentation, and operational documents (incident action plans, maps, unit logs, etc.) will be assembled and organized during and following a wildland fire management action.

Specifically, the final fire packet and file should contain:

- Any written policies, guidelines or authority statements signed by the Superintendent
- A brief narrative summarizing the events of the fire and all IMT section involvement
- Copy of complete WFIP
- Copy of WFSA
- ICS-209's
- Copies of purchase orders, personnel request orders, etc. associated with fire
- All situation maps
- Personnel rosters, time sheets
- Press releases, clippings and video tapes
- Accident reports
- All monitoring data, spot weather forecasts, internet printouts
 - Documentation of financial charges
 - Narratives and unit logs
 - Rehabilitation plans
- Unit Logs- 214

It is particularly important to include Incident Commander narratives regarding effectiveness of planned strategies, trigger points, holding actions, and other pertinent factors encountered during the fire. In case of wildland fires across boundaries, copies will be made of the entire packet for each agency involved for records.

VII. FUELS MANAGEMENT PROGRAM

A. Hazard Fuels Management

Park areas have the responsibility to identify, manage and reduce if necessary, accumulations of hazardous fuels. Objectives of fuel treatment measures include protecting private property, administrative sites or facilities and other investments during prescribed fires or wildfires and to lessen the probability of an undesirable structural or human-caused fire escaping into adjacent park areas.

Fuel treatment measures that may be used to reduce the risk to protected areas include mechanical manipulation outside the wilderness boundary or wildland fire use or prescribed fire within the wilderness boundary when wilderness management objectives and conditions are not being met.

Hazard fuel treatment may include:

- constructing a clear zone around structures
- constructing fuel breaks where no natural barriers to fire exist
- using a combination of trimming and physical removal of downed accumulation to establish the clear zone (may be combined with debris burning)
- debris pile burning
- using a combination of mechanical fuel reduction and prescribed fire to reduce downed accumulations near sensitive historic or cultural resources
- chipping or reducing size or number of downed fuels
- roadside pruning
- roadside mowing during fire season to reduce accumulation of fine burnable fuels with low fuel moisture
- brush removal or pruning near structures
- removal of limbs overhanging structures

As described under FMU – 1, the primary areas of concern are the wildland/urban interface at the entrances at Nisqually, Carbon River and the north boundary on State Highway 410 and facilities at Longmire, Paradise, Ohanapecosh, White River and Sunrise. Preferred methods of modifying fuels in these areas will include physical removal of dead and downed debris, removal of ladder fuels adjacent to structures and thinning.

Wilderness backcountry structures of historical or administrative value with adjacent accumulations of hazardous fuels will be evaluated and be assigned specific protection criteria. Mitigation for preservation from damage due to wildland fires should include periodic removal of ladder fuels immediately adjacent to the structure and removal of debris from roofs. These measures should consider the wilderness character of the area around the structure and not compromise the aesthetic value of the landscape.

The structures listed in the appendix should be assigned a relative value of protection based on significance using computer programs such as FARSITE. Parameters for treatment of each structure will factor the fuel model, estimated fire intensity, crowning fire potential and overall fire potential. Trail structures such as bridges and other improvements may be protected by gravity socks and hoses. MIST guidelines will be used. Major vegetation modification will not be taken around wilderness structures.

The objective of these actions is to increase the probability of success of the program and to reduce the threat of escape from the area of concern or to allow significant damage to capital investments or areas of historical significance.

Debris created by fuel treatment practices will be disposed of based on the area being treated. The preferred method in developed areas will be to utilize a motorized chipper for the fuel less than 3 inches. The chips can be directed to fall in wooded areas as appropriate or into the bed of a dump truck for disposal at an approved site. Larger live or dead material will be scattered away from the structure to be protected at such a distance and in such a manner to reduce the threat from wildfires while maintaining an authentically pleasing landscape in developed areas. Wilderness fuel treatments will be accomplished with handsaws whenever possible with the resulting debris scattered the minimum distance to ensure adequate fire protection.

The following is a list of action items to be considered when developing project-level plans involving hazard fuel reduction (including mechanical treatment and prescribed fire).

- Develop project objectives and site-specific treatment methods to accomplish objectives.
- Preparation of an annual program priority lists and maps for archaeological/biological survey by the agency FMO prior to January 15 of each year. The lists should identify projects in priority order, and be submitted to the Superintendent for distribution to resource staff (current year proposals and one year in advance proposals).
- Field Surveys will be conducted based on individual project maps in accordance with Section 106 of the National Historic Preservation Act (NHPA), and Section 7 of the Endangered Species Act (ESA) (including any Biological Assessments associated with this plan) and internal agency policy.
- Upon completion of project surveys and clearances, written project approval, including any required mitigation is submitted to the FMO.
- Following mitigating actions, original copy of burn plan will be routed with attached clearances by the agency FMO/burn boss through agency-directed routing protocol to Superintendent or designee for approval.

B. MECHANICAL FUELS REDUCTION PROGRAM

Non-Fire Treatment

Under this Alternative, all natural and human-caused ignitions in the park would be extinguished as quickly and efficiently as possible, given the constraints of safety, feasibility and minimum impact management, and using a combination of ground and aerial resources to contain the fire. Exceptions to immediate and direct fire suppression would be made on a case-by-case basis for reasons of inaccessibility, life/safety concerns for firefighters, or a lack of availability of suitable resources, personnel or equipment. There would be no use of wildland fire as a natural process, prescribed fire or hazard fuel reduction in the park. All wildland fires would be suppressed using the appropriate suppression response. Appropriate suppression would occur regardless of ignition source or location. Depending on the location and projected fire behavior, ground and/or aerial fire fighting resources would be employed to contain the fire to its smallest possible size and ground or aerial monitoring would be conducted until the fire was mopped up (completely extinguished). All fire suppression in park wilderness would employ minimum impact suppression tactics (MIST) see the appendix, or the wilderness impacts analysis section of this Environmental Assessment.

Although the intent, under this, would be to suppress all fires as quickly as possible, some fires would escape initial attack and some fires, following initial attack, could be placed in a confinement strategy, dependent on weather and fuel conditions that would enable suppression. Because of increased fuel loading not alleviated by fire, this Alternative would have increased potential to create catastrophic fires with potentially greater long-term impacts, including a greater volume of fuels burned, more smoke production (duration and particulate), and more widespread landscape changes, including to vegetation, wildlife, and cultural resources.

This alternative would not meet the goals of restoring and maintaining natural fire regimes or perpetuating natural ecosystem processes. As a result if continued suppression of naturally ignited wildland fires occurred, there could be significant changes over time to the successional conditions naturally occurring in the park. Detection of fire suppression impacts on park vegetation composition

and distribution could go unnoticed by park managers as a result of the naturally long fire return intervals (465 years on the west side of the park, 200 years on the east side). Some changes in species distribution would take centuries to manifest themselves. The past 100 years of fire suppression has likely already changed what would have been natural vegetation community characteristics in a landscape unaltered by direct fire suppression. As a result, under establishment of long-term monitoring programs, fire related changes have been identified as a key issue to investigate. To the extent that Native Americans used fire in the park and surrounding areas, these conditions have also likely been altered by unnatural fire suppression. This alternative would continue to limit the natural role of a fire as an ecosystem agent of change, and in the long-term, this alternative would alter the natural composition, diversity and structure of park vegetation communities. It would also result in impacts on wildlife distribution and presence. Without systematic treatment, accumulations of forest fuels in proximity to historic structures and major developed areas would continue to present a fire hazard.

C. Hazard Fuel Reduction

Limited Manual/Mechanical Treatment

Manual/Mechanical Treatment would be implemented as it has been in the past in developed areas around structures and along park roads, using hand tools to periodically limb overhanging vegetation, selective removal of trees growing too close to structures, and roadside mowing/limbing and removal of fallen trees and limbs. Around structures, and along roads, the first priority would be to ensure administrative and visitor safety and protection of park resources. This includes maintaining the structural integrity of the buildings and the road prism and reducing fine fuels along roadsides to prevent fire spread, should a fire occur.

Manual/Mechanical treatment is also conducted in developed campgrounds to eliminate branches and other vegetation near fire pits. Non mechanical treatment to removed dead and downed materials in developed areas and along roadsides also occurs. Roadside mowing primarily focuses on increasing visibility along park roads, including sight distance, and on maintaining the parkway like character of some park roads, but also serves, as mentioned, to reduce fine fuels along roadsides. The maximum number of acres wherein Manual/Mechanical treatment of hazardous fuels would occur would be less than 800 acres or approximately 20 percent of the non-wilderness areas of the park per year (over five years). Treatment of this area, while it could be spread over the breadth would not be uniform.

Park visitor and administrative facilities, including buildings and structures necessarily occupy a large percentage of this space and therefore the treatment area is somewhat overstated. Excluded from this estimate is the non-wilderness area that would not be treated, including those areas south of the Nisqually to Paradise Road below Longmire (not adjacent to the road); Camp Muir; a small area north of the Carbon River Road (not adjacent to the road); as well as the Paradise and Sunrise meadows.

Under any projects or circumstances that would result in excess natural forest residue defined as limbs, slash, plants and logs), the preferred option is to leave these in place. Where the material cannot be left on the forest floor to undergo natural decomposition, it would be used in a variety of ways for park projects (compost, chipping, re-vegetation, and historic structure rehabilitation, trails maintenance, campfire programs, heating public buildings). Utilization of alternative technologies for disposal, including chipping of forest residue in place, for re-vegetation or native plant nursery, or haul to composting facility is also considered.

Trees and limbs that fall across roads and trails would be placed back in the forest whenever this can be accomplished in a way that makes them appear natural (as discussed in Office Order 88-1 Roadside Vegetation Management and subsequent updates). All limbs and brush cleared for health and safety reasons would be placed into the surrounding forest without further compromising safety or resource protection.

Overall, this alternative would result in the smallest expected degree of fire in the park in the short term, however in the long-term it could result in the most catastrophic fires. It would meet the goal of ensuring firefighter and public safety by keeping all fires as small as possible. The actual size and number of fires would depend on prevailing weather patterns, the location of lightning strikes, and the extent of fire spread before naturally extinguished (dependent on weather and fuel conditions) or suppressed. Although it would provide some protection to resources not able to withstand fire, it could result in eventual catastrophic fire, which could result in the loss of important cultural resources, including buildings and structures listed on the National Register of Historic Places.

This alternative would not enable ecosystem processes to function as they have in the past since all fires would immediately be suppressed. Species dependent on more frequent fire would begin to diminish over time. This would likely go unnoticed by park managers because of the extremely long fire return intervals over much of the park. Reducing hazardous accumulations of fuel in developed areas would not be undertaken systematically. Most hazardous accumulations of fuel would not be treated.

1. Hazard Fuel Reduction

Limited Debris Burning

There would continue to be very limited use of debris burning of forest residue generated as a result of Hazard Fuel Reduction or road and other maintenance activities to prevent accumulations of hazard fuels near historic and administrative structures. Such debris burning would continue under certain circumstances and only when the procedures outlined in the park's Office Order 83-2 (Disposal of Natural Forest Residue and Manufactured Lumber) or its subsequent updates are followed. Under Office Order 83-2, the park has designed some very specific procedures to limit the disposal of wood debris by burning. These guidelines were developed to comply with current regulations from the Puget Sound Clean Air Agency (for Pierce County), the Southwest Clean Air Agency (for Lewis County), and the Washington Department of Natural Resources, to meet Clean Air Act mandates and to ensure the highest degree of protection of park air quality (as required for class I areas under the Clean Air Act).

If any of the above-described alternatives for disposal of materials from manual/mechanical treatment are not feasible, the burning of forest debris is conducted following established conditions (see Alternative 1 Air Quality Impacts). The maximum number of burn days that would occur under this alternative would be determined by air quality regulations, including the Washington State Visibility State Implementation Plan (SIP), staffing and weather conditions.

Mechanical treatment methods will be a primary tool for management to reduce [hazardous] fuels continuity and create defensible space around values at risk. Prescribed fire follow-up treatments may or may not be employed. Mechanical removal of fuels from roadsides and near park structures is needed to prevent human ignited fires and to protect historic structures. Hazard Fuels Project Requests will be submitted per NPS-18, Section IV, and Chapter 5, to remove these fuels.

2. Use of Fuel Breaks

Fuel break construction should be identified on an appropriate Geographic Information System (GIS)-compatible project location map (exact locations using GPS). Fuel break planning will consider the following guidelines (see also mitigation measures below):

- Some green-stripping to mask the thinning in areas used by visitors;
- Canopy thinned and feathered (or gradually opened) toward the area being defended against, with spacing necessary to prevent crown fire and/or "wind tunnel" effect;
- Retain a reasonable level of surface forbs and other plants to discourage exotic invasion.
- Fuel-break width is dependent on fuels conditions and other considerations.
- Consider key photo-points installed to monitor vegetative recovery, exotic invasion, etc. All burn preparations involving pre treatment with mechanical techniques will be outlined in a burn plan

and given review by appropriate resource staff as necessary.

This may include but is not limited to:

- Snag felling, bucking in and around perimeter;
- Reducing tree densities along perimeter;
- Pruning individual trees and brush along perimeter;
- Bucking and removal of logs near the control line only (through bucking into short lengths, piling and burning on site)

**Table A: Mount Rainier National Park
Treatment Categories For
Hazard Fuel Reduction and Cultural Resource Maintenance**

Treatment Category	Type of Treatment (see discussion following table for detailed description of treatment)	Characteristics of Structures in this Category	Examples of Structures in this Category
A	No Treatment	Non-Wilderness or Wilderness setting: Small structures isolated from hazard by lawns or compounds. No historic significance.	Structures at Tahoma Woods headquarters
B	0-15 Feet Routine brushing, limbing to keep branches away from roof, gutters, doors.	Non-Wilderness or Wilderness Setting: Small, low value structures without historic significance; or historic materials such as fence lines.	Rustic outbuildings and entrance stations
C	0-30 Feet Intensive Mgmt.	Non-Wilderness: Low to moderate value structures without historic significance. Wilderness: Shelters, may have historic significance.	Campground restrooms, vault toilets, backcountry shelters.

Treatment Category	Type of Treatment (see discussion following table for detailed description)	Characteristics of Structures in this Category	Examples of Structures in this Category
D	0-30 feet Intensive Mgmt. 30-90 Feet Selective Mgmt.	Non Wilderness: Moderate value structures; or higher value structures in areas of low fire potential. Wilderness: Isolated cabins. Structures may have historic significance.	Patrol Cabins
E	0-30 feet Intensive Mgmt. 30-90 Feet Selective Mgmt. 90-150 Feet: Remove Brush and Ladder Fuels	Non-Wilderness or Wilderness: Building complexes, or high value structures, or close to boundary or inholdings. Any projects undertaken in cooperative mgmt. with neighbors/inholders. Structures may have historic significance.	Park housing areas
F	0-30 feet Intensive Mgmt. 30-90 Feet Selective Mgmt. 90-250 Feet: Remove Brush and Ladder Fuels	Non-Wilderness: Structures close to a wildland-urban interface community.	Government structures and Housing
G	Treatment of structures as in F, plus manipulation of vegetation as necessary to maintain historic scene.	Historic Districts.	Longmire Historic District

2. Detailed Description of Treatments:

The zone concept is adapted from the pamphlet, "Defensible Space", 11/91, endorsed by the National Park Service, United States Forest Service, Bureau of Land Management, Bureau of Indian Affairs, Washington State Department of Natural Resources, and Oregon Department of Forestry. Produced in association with the Center for Urban Horticulture and College of Forest Resources, University of Washington, and the Pacific Northwest Interagency Fire Prevention Group representing Oregon and Washington. The document states :

"Your home landscape needs three zones (lines of defense) against encroaching wildfire. Plants in each zone perform a distinct function. The transition between zones creates breaks in the path to slow advancing flames. Experience has revealed that a *minimum* distance of 100 to 150 feet around your home needs this comprehensive landscaping. Greater distances are necessary on steep slopes or windswept exposures."

The zone treatments outlined below for Mount Rainier National Park are somewhat less intensive than outlined in the Defensible Space pamphlet, to reduce impacts to the natural habitat and environment. All descriptions below reflect the *maximum* treatment that would occur. *Less* manipulation may be made depending on site characteristics and concerns, such as wilderness integrity, slope, neighboring fuels, access for emergency equipment, proximity of firefighters/engine, use of the area, sensitive resources, etc. An interdisciplinary team will help develop site specific hazard fuel reduction plans. A monitoring component will be part of the hazard fuel reduction program, to track the effectiveness of treatment and detect unplanned changes.

A No action.

B Zone 1

0-15 feet from structure: Low-growing, fire resistant plants resist catching fire and provide little fuel. This zone may contain occasional individual shrubs and trees located at least 10 feet from the house. Perform routine maintenance to keep brush away from roof, doors, gutters, and remove dead woody material on ground and in standing vegetation. Remove or prune trees that impinge on the building.

C Zone 1

0-15 feet from structure: Low-growing, fire resistant plants resist catching fire and provide little fuel. This zone may contain occasional individual shrubs and trees located at least 10 feet from the house. Perform routine maintenance to keep brush away from roof, doors, gutters, and remove dead woody material on ground and in standing vegetation. Remove or prune trees that impinge on the building.

15-30 feet from structure: To create a fire-resistant defensible space (and open the building to light and air), intensive management will remove dead and down fuels, brush and tree reproduction up to 24" dbh. Well spaced trees and shrubs may be retained, but dead limbs or limbs overhanging the structure will be removed. Ladder fuels will be removed to a height of 8-10 feet.

D Zone 1

0-15 feet from structure: Low-growing, fire resistant plants resist catching fire and provide little fuel. This zone may contain occasional individual shrubs and trees located at least 10 feet from the house. Perform routine maintenance to keep brush away from roof, doors, gutters, and remove dead woody material on ground and in standing vegetation. Remove or prune trees that impinge on the building.

15-30 feet from structure: To create a fire-resistant defensible space (and open the building to light and air), intensive management will remove dead and down fuels, brush and tree reproduction up to 24" dbh. Well spaced trees and shrubs may be retained, but dead limbs or limbs overhanging the structure will be removed. Ladder fuels will be removed to a height of 8-10 feet.

Zone 2

30-90 feet from structure: To reduce the rate of spread and intensity of fires approaching or leaving a structure (and maintain forest openings consistent with historic settings), tree reproduction and

second growth trees up to 24" dbh will be selectively thinned to create a crown spacing of at least 10 feet. Snags, dead and downed fuels, and ladder fuels will be removed. This zone will provide a transition between the intensively managed zone next to the structure, and the untreated forest surroundings.

E Zone 1

0-15 feet from structure: Low-growing, fire resistant plants resist catching fire and provide little fuel. This zone may contain occasional individual shrubs and trees located at least 10 feet from the house. Perform routine maintenance to keep brush away from roof, doors, gutters, and remove dead woody material on ground and in standing vegetation. Remove or prune trees that impinge on the building.

15-30 feet from structure: To create a fire-resistant defensible space (and open the building to light and air), intensive management will remove dead and down fuels, brush and tree reproduction up to 24" dbh. Well spaced trees and shrubs may be retained, but dead limbs or limbs overhanging the structure will be removed. Ladder fuels will be removed to a height of 8-10 feet.

Zone 2

30-90 feet from structure: To reduce the rate of spread and intensity of fires approaching or leaving a structure (and maintain forest openings consistent with historic settings), tree reproduction and second growth trees up to 24" dbh will be selectively thinned to create a crown spacing of at least 10 feet. Snags, dead and downed fuels, and ladder fuels will be removed. This zone will provide a transition between the intensively managed zone next to the structure, and Zone 3.

Zone 3

90-150 feet from structure: To reduce fire intensity and keep fires on the ground, brush and ladder fuels will be removed. Isolated dead and dying trees, or "leaners" will also be removed.

F Zone 1

0-15 feet from structure: Low-growing, fire resistant plants resist catching fire and provide little fuel. This zone may contain occasional individual shrubs and trees located at least 10 feet from the house. Perform routine maintenance to keep brush away from roof, doors, gutters, and remove dead woody material on ground and in standing vegetation. Remove or prune trees that impinge on the building.

15-30 feet from structure: To create a fire-resistant defensible space (and open the building to light and air), intensive management will remove dead and down fuels, brush and tree reproduction up to 24" dbh. Well spaced trees and shrubs may be retained, but dead limbs or limbs overhanging the structure will be removed. Ladder fuels will be removed to a height of 8-10 feet.

Zone 2

30-90 feet from structure: To reduce the rate of spread and intensity of fires approaching or leaving a structure (and maintain forest openings consistent with historic settings), tree reproduction and second growth trees up to 24" dbh will be selectively thinned to create a crown spacing of at least 10 feet. Snags, dead and downed fuels, and ladder fuels will be removed. This zone will provide a transition between the intensively managed zone next to the structure, and Zone 3.

Zone 3

90-250 feet from structure: To reduce fire intensity and keep fires on the ground, brush and ladder fuels will be removed. Isolated dead and dying trees or "leaners" will also be removed.

G Same as Treatment F, plus manipulation of vegetation as necessary to maintain historic scene in Historic Districts.

D. PRESCRIBED FIRE PROGRAM

Prescribed Fires are defined as all fires that are not management ignited wildland fires. These fires are planned, scheduled, organized and implemented according to a rigorous protocol. The purpose is safe accomplishment of approved resource objectives. Escaped prescribed fires as with wildland fires used for resource benefit, that exceed prescription will be managed under a suppression strategy, regardless of whether they go back into prescription. During each prescribed fire or wildland fire, there will be a qualified Incident Commander Type III crew pre-designated and available in the event of an escape.

1. Exceeding Existing Prescribed Fire Plan

When a prescribed fire is unsuccessful and threatens to escape its defined boundary or parameters, a Wildland Fire Situation Analysis will be developed and the fire declared a wildfire.

2. Air Quality and Smoke Management

Mount Rainier National Park is in a mandatory class I area under the Clean Air Act (1977). Class I areas are afforded the highest degree of protection under the Clean Air Act. This designation allows very little additional deterioration of air quality. The Clean Air Act states that park managers have an affirmative responsibility to protect park air quality related values (including visibility, plants, animals, soils, water quality, and cultural resources and visitor health) from adverse air pollution impacts. Special visibility protection provisions of the Clean Air Act also apply to class I areas, including new national rules to prevent and remedy regional haze affecting these areas. Under existing visibility protection regulations, the NPS identified "integral vistas" that are important to the visitor's visual experience in NPS class I areas, and it is NPS policy to protect these scenic views.

National Ambient Air Quality Standards (NAAQS) must be met. Visibility impacts confined to wilderness and due to naturally ignited wildland fires are generally more acceptable than impacts occurring outside of wilderness, especially when coupled with an interpretive program explaining the benefits of fire.

Impacts of smoke on public health would also occur, with negligible to minor impacts from small fires or suppression efforts and larger impacts when fires are more extensive or nearer populated areas, including when inversions hold smoke at lower elevations or air currents carry smoke down valley. Large or small fires could smolder for a few days to a few weeks or more. Smoke would be diluted to some degree by mixing and dispersion. The degree to which this would occur would depend on localized and regional weather patterns, topography and other factors. Public information would be expanded when increased smoke management concerns are evident, enabling sensitive people to take appropriate measures to limit their exposure. Drift smoke from fires could affect area travel corridors, including park and other roads, resulting in reduced visibility for drivers, an increased need for traffic control and other effects.

Any impacts to air quality, therefore, are considered potentially detrimental. In contrast to surrounding metropolitan areas, air quality within the park is usually good; however, high ambient sulfate levels, low pH levels of airborne water droplets, and high ozone levels have all been documented. Campfires, generators, heating systems and the operation of motor vehicles and equipment all may cause local, temporary air quality degradation.

Surrounded by developed areas in King, Pierce, Lewis and Yakima counties, however, stationary and mobile emissions in the region are the major source of air pollution near the park. These include industrial developments, power plants (notably the Centralia Power Plant), slash burning, pulp and paper mills, etc. The Clean Air Act also requires consideration of the protection of air quality related values, such as visibility and scenic vistas that are occasionally significantly affected by non-attainment particulate concentrations in the surrounding areas.

All fire management activities at Mount Rainier National Park, which result in the discharge of air pollutants (e.g., smoke, carbon monoxide, and other pollutants from fires) are subject to, and must comply with, all applicable federal, state, interstate and local air pollution control requirements, as specified by Section 118 of the Clean Air Act. In addition, MORA will fully comply with the Washington State Smoke Management Plan.

- Full coordination and cooperation with the State of Washington Department of Ecology, Department of Natural Resources and cooperating agencies at the time of an unscheduled ignition is required. This cooperation is in reference to a decision to designate a “use” fire.
- In the fire prescription validation process, the park FMO will utilize the daily WIMS smoke management forecast and available computer modeling programs such as RERAP and PUFF. Smoke concerns will be considered in the initial Go/No Go decision making process. Mount Rainier National Park is a federally designated “Class 1” air shed, and as such is protected from human-caused pollution. Natural processes in Class 1 air sheds are protected by the Wilderness Act of 1964. As such, smoke from natural wildland fires is not “manmade” and is therefore not considered pollution, as defined in the federal Clean Air Act and the Washington Smoke Implementation Plan. Class 1 air sheds in the vicinity of the park also include the Goat Rocks Wilderness, the William O. Douglas Wilderness, the Glacier View Wilderness, the Clearwater Wilderness and the Tatoosh Wilderness. The closest non attainment area is Yakima 65 miles to the southeast. Smoke impacts from natural wildland fires will typically be of short duration, and temporary impacts to visibility and visitor enjoyment must be recognized, expected, and managed. The effects of smoke impacts to park visitors, concessions, park neighbors and air quality values will be carefully considered in the daily prescription validation process.
- Visual impacts from smoke on recreational or commercial users will be considered during the Go/No Go decision process, as will negative impacts to rare, threatened or endangered species, especially those areas containing nesting sites. Development of a natural wildland fire prescription will include the determination of unacceptable smoke impacts on sensitive areas. The prescription will include a process for monitoring impacts to sensitive areas. Descriptions of smoke plume size, direction of travel and other pertinent measurable information will be part of the criteria used in determining if the fire is in prescription.
- The complete fire case incident report, including daily records of verification of prescription, will be maintained in the park case incident records by the Communications Center.

When natural wildland fires are in progress, appropriate media releases will be prepared, and interpretive programs/walks and/or temporary signing will address or explain fire policy as needed.

E. WILDLAND FIRE IMPLEMENTATION PROCEDURES (PREPLANNED – PRESCRIBED FIRE)

This section refers to the use of prescribed fire to accomplish resource management objectives. Although there are no immediate plans to use prescribed fire in Mount Rainier National Park, the use of prescribed fire is considered an appropriate fire management strategy and is described below. When individual prescribed burn plans are created, prescribed fire implementation procedures will be developed.

Annual actions which should be considered by the FMO or assigned burn boss in implementing a project prescribed fire program include the following:

- Field reconnaissance (including GPS) and burn unit layout,
- Preparation for compliance work (involving resources staff as needed to identify values to be protected, etc)
- On-site documentation, fire effects monitoring plot layout, logistics, and identified mitigation work;

- complete complexity rating
- Job hazard analyses
- Analyze potential ignition patterns with prescriptions, weather, fuels, topography
- Coordination of all burns with media
- Identify air quality and smoke management considerations, including monitoring, modeling, consultation w/NMEID
- Personnel management, fiscal analyses
- Pre-burn notifications
- Briefings, logistics, contingencies
- Evaluation of go/no-go decision process
- Organization, implementation of logistics
- Follow-up coordination, evaluations, cost summaries, record keeping, reporting requirements (a DI-1202 will be completed for each burn and submitted via input through relevant agency channels within 10 working days after declared out date)
- Submit data for addition to GIS prescribed fire thematic map

All prescribed fires will be critiqued as deemed appropriate by the agency burn boss or FPM. Reviews can be convened by the NPS Superintendent (authority *RM-18*) or as directed in agency policies.

Reviews may be comprised of the following:

- Annual activities to prepare for and implement program
- Relate long-term prescribed fire strategy to each FMU/include planned burn units
- Identify the numbers and kinds of personnel to plan and execute the proposed annual prescribed burn plan
- Define the weather, fire behavior, fire effects monitoring (see more Chapter 4)
- Provide format for critiques of prescribed fire projects
- Describe reporting and documentation requirements

Prescribed Fires are planned, scheduled, organized and implemented according to a rigorous protocol. Their purpose is safe accomplishment of predefined resource benefit objectives. Escaped Prescribed Fire, as well as Wildland Fire Use that exceed appropriate prescriptions would be managed under a Fire Suppression strategy, regardless of whether they go back into prescription. Prescribed fire plans are now required to undergo agency peer review as well as individual environmental analysis (including public review). As prescribed fire plans are developed the park would likely conduct environmental analysis for a multi-year prescribed fire action plan, rather than assessing each prescribed fire separately.

As envisioned, Prescribed Fires could be used to:

- maintain scenic vistas;
- maintain fire dependent plant communities;
- maintain some boundary areas (where cross-boundary fire was unacceptable);
- manage sensitive resource areas that would need to have cooler fires with lower intensities to prevent damage to the resource at risk;
- restore cultural or ethnographic landscapes; and to
- reduce hazard fuel accumulations near developed areas, etc.

Prescribed Fires would include measurable criteria (the prescription) that define the specific environmental conditions under which park managers would ignite a fire. Prescription criteria include weather conditions (current and forecast), determination of a maximum manageable area, appropriate holding force availability, fire starting techniques and timing. These prescription criteria would ensure that the fire remained within a pre-designated perimeter without threatening life or property and met resource objectives. To the extent possible, Prescribed Fire (as well as Wildland Fire Use) implementation would:

- use natural barriers rather than constructed fire lines to prevent fire spread and to minimize consequent impacts to soils and other park resources;
- minimize up and down slope fireline construction;
- utilize controlled burn intensities to result in a fast-moving, lower temperature impact fire; and
- require post-fire rehabilitation of fire lines, including efforts to reduce compaction by scarifying the soil, and installing natural erosion barriers.

Although there are currently no plans to conduct Prescribed Fire within Mount Rainier National Park, under future implementation of the FMP, such a plan would be written and separate environmental analysis would be conducted for each proposed Prescribed Fire. The most likely areas that would be targeted for Prescribed Fire would be the white bark pine community and potential research burns in forested or subalpine communities. Other Prescribed Fire use might include establishing a very limited, but more frequent fire regime around developed areas where great concentrations of important historic structures are located, such as at Longmire and Paradise. Finally, Prescribed Fire might be used to ensure that fire did not cross the park boundary where the adjacent landowner was unwilling to accept or unable to manage wildland fire.

VIII. FIRE MANAGEMENT ORGANIZATION AND RESPONSIBILITIES

A. FIRE MANAGEMENT ORGANIZATION & ROLES

The fire focused IDT, Interdisciplinary Team, should meet annually prior to the fire season no later than January 30th to discuss areas of responsibility, review, update the plan, and to discuss/evaluate fire decision capabilities.

Contingent upon fire complexity (fires involving more than 10 acres or more than 10 individual fires), the entire team or appropriate members thereof (minimum of Supt. or acting, FMO or acting, and Natural and Cultural Resources Division representative), will meet to review the decision process.

The IDT Team or their appointed staff member will consist of the following:

- Superintendent – Chair and Deputy
- Chief, Natural and Cultural Resources Division
- Chief Ranger
- Fire Management Officer
- Administrative Officer
- Chief of Interpretation
- Chief of Maintenance and Dispatch Supervisor

Superintendent

The Superintendent has the ultimate responsibility for the execution of the fire management program at Mount Rainier National Park.

The Superintendent:

- Approves the park's Fire Management Plan and regular revisions.
- Approves the Delegation of Authority (example found in Appendix) in the event that an interagency incident or fire use team assignment.
- Approves the Go/No Go Decision
- Approves the Wildland Fire Implementation Plan (WFIP) and periodic assessments.
- Designates needed area closures.
- Reviews Fire Situation Analysis/Wildland Fire Situation Analysis (WFSA) and, based on advice of the FMO or other qualified persons, selects an appropriate management response to implement protection and fire use objectives.
- Daily revalidation of WFIP
- Evaluates the Fire Complexity Analysis in conjunction with the WFSA to determine if an Incident Management Team should be requested.
- Approves prescribed burn plans
- Agency liaison provides direction to Type I and Type II incident commanders working in the park, or designates a representative to do so.

Deputy or Acting Superintendent

Is delegated all decision making responsibility when the Superintendent is absent from the Park.

Visitor Services and Resource Protection Division

Chief Ranger

- Ensures that a comprehensive park fire management program is adequately funded and implemented.
- Manages wildland fire plan implementation, review, and revision.
- Designates a full time or collateral duty park Fire Management Officer (FMO).

- Ensures staff is trained to meet area needs.
- Ensures area equipment caches are maintained in a state of readiness.
- Recommends area closures to Superintendent
- Describes management options to Superintendent
- Provides fire detection within their areas.
- Carries out suppression activities called for in this plan or see that appropriate resources are ordered.
- Makes at least annual inspection, with the FMO, of fire suppression, detection, dispatch, and training facilities and procedures.
- Directs the park fire suppression and preparedness program
- Provides for the protection of developed areas.
- Evaluates both fire “use” and prescribe fire prescriptions.
- Prepares Incident Management Team briefing package.

Fire Management Officer

- Maintains qualification and training records.
- Establishes liaisons with cooperating agencies, and coordinates and maintains cooperative agreements.
- Maintains fire weather/fire records and SAC/IQCS data.
- Coordinates park wide fire training and equipment acquisition.
- Maintains park wide fire crew lists and equipment records.
- Maintains Weather Information Management System (WIMS) and the NPS Wildland Fire Computer System (SACS) data input.
- Advises the Communications Center supervisor on fire dispatch and reporting responsibilities.
- Coordinates annual review of the Fire Management Plan.
- Advises staff on fire management responsibilities.
- Coordinates preparation of WFIP and WFSA.
- Ensures fire reports (DI-1202) are properly prepared by the Incident Commander, and submitted to the Columbia Cascades Support Office and/or entered into SACS.

Chief of Maintenance

The Chief of Maintenance or staff designee:

- Supports fire management by accomplishing related work orders, such as mechanical hazard fuel reduction, fire cache repair, equipment maintenance, etc.
- Provides appropriately trained personnel to assist the fire management program, including firefighters, engine foreman, logistics personnel, etc.
- Implements/assists with closures of trails, roads and facilities.

Administrative Officer

The Administrative Officer or staff designee:

- Provides financial advice and accounting information.
- Provides appropriately trained personnel to assist the fire management program, including firefighters, logistics and comps and claims, finance personnel, etc.

Chief of Interpretation

The Chief of Interpretation:

- Serves as a PIO, information officer
- Includes fire ecology and fire prevention public education in park programs, as appropriate.
- Provides appropriately trained personnel to assist the fire management program, including firefighters, information officers, etc.

Chief of Natural and Cultural Resources

The Chief of Natural and Cultural Resources, or staff designee:

- Provides scientific expertise regarding:
 - Fire effects.
 - Maps, fuels, topography, and vegetation.
 - Management options.
 - Resource impacts/benefits.
 - Post season evaluation.
 - Rehab and BAER (Burned Area Emergency Rehab)
- Provides scientific review of the Fire Management Plans to ensure a sound ecological basis for management actions.
- Provides appropriately trained personnel to the fire management program, including firefighters, fire monitors, planning staff, resource advisors, etc.

Overall, park managers are responsible for revising responsibilities and assigning appropriate tasks to the most qualified staff as personnel relocate. The park will maintain qualified personnel to meet expected fire management needs. The Fire Staffing Plan is included in the Appendix.

Incident Commanders

A specific Limited Delegation of Authority will be provided to each Incident Commander prior to assuming responsibility for an incident. Major duties of the Incident Commander are given in the NWCG Fireline Handbook.

Incident Commanders:

- Brief subordinates, direct their actions and provide work tools.
- Ensure that safety standards identified in the Fire Orders and agency policies are followed at all times.
- Personally scout and communicate with others to increase knowledge of fire conditions, fire weather, tactical progress, safety concerns and hazards, condition of personnel, and needs for additional resources.
- Order resources to implement the management objectives for the fire.
- Inform appropriate dispatch of current situation and expected needs.
- Coordinate mobilization and demobilization with dispatch and FMO
- Perform administrative duties, i.e., approving work hours, completing fire reports for command period, maintaining property accountability, providing or obtaining medical treatment and evaluation performance of subordinates.

Initial Attack Teams

On most small fires, initial attack teams will consist of at least five red-carded firefighters and an IC Type III. IA teams will be prepared and equipped with hand and power tools as needed and will be dispatched with a day's supply of food and water so that they can continue work with 24 hours without additional support.

B. Incident Command System

All wildland fires will be managed under the Incident Command System (ICS). The FMO will ensure that each wildfire is assigned a fully qualified Incident Commander (IC) for the appropriate size and complexity of the fire. The FMO, if qualified, may serve as the IC or may designate a qualified IC who serves under the FMO. The IC manages all assigned resources, whether suppression or monitoring; implements the selected strategy from the WFIP or WFSA; and collects data to permit update of the analysis as necessary. Fire suppression activities are non-routine in nature, cannot be scheduled in advance, and will be automatically approved. For wildland fire suppression activities, the IC will generally be the FMO or the other qualified staff.

The FMO shall ensure that a Wildland Fire Implementation Plan (WFIP) is completed for each wildland fire for resource benefits. The stage (I, II, III) of the WFIP is dependent on the status of the fire management strategy – for instance, wildland fire use for resource benefits or suppression.

A Wildland Fire Situation Analysis (WFSA) is completed for each unsuccessful action on a wildland fire or for prescribed fire escapes. The WFSA provides the IC and park managers an analysis of alternatives to utilize. As needed the FMO will consult with resource advisors and other park management staff regarding the potential effects of contemplated actions on park resources. The WFSA is submitted to the FMO, Chief Ranger and approved by the Superintendent.

1. INTERAGENCY INCIDENT MANAGEMENT TEAM BRIEFINGS

The briefings with the Superintendent and the initial attack incident commander should take place as soon as the Incident Management Team arrives. All members of the team should be present at the briefing, but only one person should conduct the briefing (usually the IC or Planning Section Chief). Questions should be held until the end of the briefing.

There is a outline for this briefing in the Interagency Standards for Fire and Fire Aviation Operations 2003, also known as the “Red Book”.

In addition to the information listed on this briefing form, a large map of the area and a complete list of resources will be needed. The agency dispatcher also needs to have a copy of all resources orders for the Supply Unit Leader and IAP a copy of the area map and fire map for each member of the team.

2. SUPERINTENDENT’S BRIEFING

General Information

- Overview
- Name and number of incident
- Approximate size and location
- Name of current Incident Commander
- General weather conditions
- Experienced fire behavior
- Fuel types
- Current tactics
- ICP and fire camp location and restrictions
- Written Delegation of Authority to incoming IC
- Status of Area Command
- Names of resource advisors assigned to incident.
- Names, telephone numbers and radio call signs of LE Rangers
- List of park available resources
- List of available park personnel and qualifications
- List of committed park personnel and position assigned to incident
- Local fire policy and guidelines
- Concerns relating to resource values, wilderness issues, cultural resources, threatened and endangered species
- News media procedures
- Political considerations
- Cooperative agreements
- Date and time of team transition
- Safety issues
- Planning
- Unusual fire behavior and/or fire history
- Legal considerations
- Pre-attack or resource protection plans

- Park needs for release of committed resources
- Incident Status Summary (ICS-209) reporting requirements
- Copy of Wildland Fire Implementation Plan
- Agency capabilities for team operations support
- Logistics
- Transportation routes
- Procurement unit in place or ordered
- Available facilities
- Medical
- Administrative
- ICP
- Air operations/airport
- Law enforcement agencies adjacent to park
- Finance
- Fiscal limitations and constraints
- Contracting officer assigned
- potential for claims
- current IAP

3. INCIDENT COMMANDER BRIEFING

- IC/Command Staff
- Incident map
- Fire Situation
- Discovery date/time
- Point of origin
- Legal description
- Current size
- Fuel types
- Topography
- Local hazards
- Fire behavior concerns
- Review Wildland Fire Implementation Plan
- Operations
- Current strategy
- Tactics to date
- Aircraft usage and availability
- Hand Crew operations
- Engine operations
- Helibase/helispot locations
- Smoke conditions and concerns
- Initial Attack responsibilities
- Planning
- Resources available
- Resources ordered
- Availability of maps, photos, GIS
- Water sites
- Weather forecasting resources
- Logistics
- ICP site
- Access routes to staging areas, drop points and fireline
- Communication Plan and resources
- Medical Plan

- Security issues
- Facilities available
- Transportation Plan and resources
- Traffic issues
- Finance
- Rental agreements in place
- Status of claims
- Status of payroll and time reports
- Incident costs to date

4. RESOURCES

A. Supplies and Equipment

The park maintains one wildland fire engine, Ford F600, Model 42 with a 280 gallon tank which is stationed on the east side of the Park.

Engine and heavy equipment use is limited to existing roads within the park, unless specific authorization is obtained from the Superintendent. Pumps, chainsaws and other portable mechanized equipment may be used with analysis of wilderness values and threatened and endangered species habitat.

A central fire cache is maintained at Longmire. This cache will provide all equipment and materials necessary to outfit at least 20 firefighters for an initial assignment inside or outside the park, and to supply other park caches. Other wildland fire caches are maintained to provide the basic equipment and supplies necessary for initial attack within the specific area of the park. The following caches are equipped for the numbers of firefighters as indicated:

<u>Cache Location</u>	<u># Firefighters</u>
Longmire (central)	30
Ohanapecosh R.S.	10
White River R.S.	6
Carbon River R.S.	4

Additional equipment and supplies are available through cooperators and the interagency cache system. Requests for equipment from the cache system are made through the PSICC, Puget Sound Interagency Coordination Center, at 425-744-3550. These supplies come from the Region 6 Fire Cache, 1740 SE Ochcoco Way, Redmond, OR. 97756

B. Training

The park FMO will coordinate and document training, issue fire qualification cards and certify qualifying experience prior to entry in the SACS computer system. All NPS employees assigned to wildland fire management duties will meet the training and qualification standards set by the National Wildfire Coordinating Group, as defined by NWCG 310-1. NPS wildland fire qualifications standards for positions other than those defined in NWCG 310-1 will be defined and maintained on the DOI Incident Qualification System.

Fire qualification cards are mandatory for personnel engaged in fire duties, as required in Director's Order 18. All wildland fires will be managed by an individual qualified and certified at the command level appropriate to the complexity level of the incident. Cards must be current and firefighters must have all required clothing, equipment and annual fire refresher before being dispatched to fires.

No employee will be accepted for wildland fire training or receive a fire qualification card until he or she has agreed to be available for a fire call, unless prevented by some other job responsibility or emergency. Employees must understand that such fire calls may keep them on fire duty for extended periods.

The park will provide the basic fire courses (S-130, S-190) as needed each summer, or coordinate such training through other agencies. Advanced training may be presented and made available to PNW agencies. The FMO, with assistance from qualified fire personnel, will be responsible for providing the annual fire refresher training and Pack Test. Expertise from the entire park and region will be made available to the FMO for his/her training needs.

Potential emergency hire personnel (SCAs, VIPs, etc.) will be encouraged and permitted to attend.

Fire training should include the following information:

1. Purpose and objectives of the fire management program.
2. Park ecosystem fire ecology.
3. Information regarding appropriate considerations and constraints to protect wilderness values and endangered species during suppression operations.
4. Identification of and impacts to cultural resources during firefighting operations.
5. Lessons learned from previous fire incidents.

The Fire Management Officer will also provide training to Communications Center personnel in fire dispatch procedures and WIMS terminal operation, as needed. The park supports the development of individual Type I and II overhead personnel from among qualified and experienced park staff for assignment to interagency overhead teams at the regional and national level.

Physical Fitness

Fire suppression is an arduous task in Mount Rainier National Park. Steep, rugged terrain may be mixed with heavy downed fuel loading. On prescribed fires, personnel may be required to shift from monitoring activities to suppression. Poor physical condition of crewmembers can endanger safety and lives of others during critical situations.

Personnel expected to perform fire management duties will maintain a high level of physical fitness. Testing, as a condition of employment or assignment, has been approved in the park. At present, the pack test is required. The pack test requires all arduous duty positions to walk three miles, with a 45-pound pack, on flat, level terrain, within a 45 minute time period. For positions requiring moderate fitness requirements, a person must be able to complete a two-mile hike, with a 25-pound pack, in 30 minutes. For light duty positions, person must complete a one-mile hike in 16 minutes, no pack is required. The Wildland Fire Qualification Subsystem Guide (PMS-310-1) describes the physical requirement levels of all red carded positions. All dedicated fire staff and park employees over the age of 35 must have a physical examination on file prior to testing for arduous positions, unless they have a regular, well-established personal fitness program. The physical examination requirement is every three years for firefighters. Fire physicals for Fire-pro funded positions shall be paid from the appropriate fire accounts, as per DO/RM-18.

All personnel who are expected to perform in arduous fire management duties are encouraged to take advantage of the 1/2 hour per day, three hour a week, of official time permitted for personal physical fitness exercise programs. Fire funded staff may be granted up to one hour each duty day to participate in a physical exercise program, as per DO/RM 18.

C. Communications

The park Communications Center at Tahoma Woods (park headquarters) is the dispatch center for the park. During the fire season the Communications Center is normally staffed 14-16 hours each day. Either Communications Center personnel or park rangers may be contacted after normal business hours via the 911 system by telephone callers reporting fires.

The park radio system consists of base stations at the Communications Center at Tahoma Woods, Longmire, Crystal Mountain and Paradise with repeaters and remote units at various locations. All ranger stations in areas accessible by paved road have phone lines. Radio repeaters are located on Gobblers Knob, Crystal Mountain, Mt. Fremont, Tolmie Peak, Shriners Peak and Packwood. Any fixed base radio unit in the park and most mobile units can be contacted by the Communications Center's fire dispatcher.

All fires will be reported to the Communications Center. Dispatch personnel will maintain a radio log of fire activities on ICS form 214 Unit Log. A daily situation report, 209, will be faxed to PSICC daily. Fire weather data will be transmitted to PSICC as weather data is collected from Longmire and the Ohanapecosh stations.

When a fire occurs in the park and the Communications Center is advised of its presence, personnel will first advise the park FMO. The FMO or their designee, should complete an aerial size up. The FMO and District Ranger, within whose area the fire is burning, will have the Communication Center contact an Incident Commander Type III or IV, a Crew Boss and necessary resources to manage the incident and lead the initial attack. It is recommended that the fire be evaluated from the air, before resources are placed on the ground.

If a fire has occurred outside the park and park firefighters are asked to assist, the Communications Center will notify those persons designated on the current weekly PSICC resource list by the FMO.

The Chief Ranger and other supervisors of personnel dispatched outside the park, will be notified by the park Communications Center.

D. Response

The December 1995 *Federal Wildland Fire Management Policy and Program Review* recommended that federal "guiding principles" should include several key elements. Highlighted in the review is that firefighter and public safety is the first priority. Additionally, fires are to be suppressed at minimum cost, considering firefighter and public safety, benefits, and values at risk. The appropriate management response to an incident will consider a full range of alternatives. These include, but are not limited to;

- Monitor the fire
- Allow the fire to burn to natural barriers
- Use cold trail, wet line, or a combination
- Utilize roads and trails as a fireline
- Use low impact tools

Fire management strategies for suppression will consider the full range of alternatives to include;

- Direct attack
- Indirect attack
- Parallel attack
- Other strategies as appropriate

The conditions for suppression are stated in the Wildland Fire Implementation Process Flow Chart in the appendix, discovery of a fire, all subsequent actions will be based on the following sequence:

1. Provide for safety of the public and agency personnel.
2. Determine whether the fire is human-caused or natural if possible. Fires in remote, trail-less areas will be assumed to have been caused by natural means until determined to be otherwise. Fires along trails or near camps will be suspected of human involvement. Determination of the cause will be made by aerial observations and, if necessary, by an initial attack crew. Human-caused fires will be investigated by law enforcement personnel with wildland fire arson investigation training.
3. Regardless if the fire is designated as a suppression fire or fire "use", efforts will be initiated by dispatching an initial attack group to the fire, with a qualified incident commander.
4. If the natural ignition is a Wildland Fire for Resource Benefit, a qualified monitor along with an initial attack group will be dispatched to it, with actions pending the final determination of classification as either a suppression or natural wildland fire.
5. Considering resources availability, current and predicted fire conditions and the assessment by the suppression team at the fire, the Incident Commander should estimate the likely spread of the fire and decide whether additional resources will be needed.
6. On the recommendation of the Chief Ranger and FMO, the Superintendent decides on the involvement of IMT and other agencies in suppression efforts within the park.

C. COOPERATORS

Mount Rainier National Park cooperates with neighboring agencies in suppressing fires on adjoining lands. Cooperative Agreements exist with the U. S. Forest Service and the Washington State Department of Natural Resources. Mutual aid agreements are in place with neighboring fire districts for structural fire response and urban interface fire suppression. If assistance is required, it is requested from adjacent cooperators through an established dispatch procedure. Mount Rainier National Park will comply with the National Interagency Mobilization Guide in all applicable aspects for wildland fire management.

In general, park personnel are used for initial attack of fires within or adjoining the park boundary. If assistance is requested, it is requested from adjacent cooperators under reciprocal agreements. The "closest" forces concept shall be used whenever possible. In some cases, the cooperating agency crews will suppress small fires close to or straddling the boundary or which threaten adjacent lands. Likewise, park personnel occasionally suppress fires on forest, state and private lands. Any initial attack of a fire on another agency lands will promptly be followed up with notification to the agency, to insure that proper management activities are taking place. Park fires that escape initial attack and an incident management team will manage all project fires. This may include the park's own overhead resources for smaller fires or an interagency incident management team for larger fires.

In some cases, the cooperating agency's crews will suppress small fires close to or straddling the boundary or which threaten adjacent lands. Likewise, park personnel occasionally suppress fires on forest, state and private lands. Any initial attack of a fire on another agency's lands will promptly be followed up with notification to the agency, to insure that proper management activities are taking place. Park fires that escape initial attack and an incident management team will manage all project fires. This may include the park's own overhead resources for smaller fires or an interagency incident management team for larger fires.

Daily verification of available resources will be accomplished through NPS participation with the Puget Sound Interagency Communications Center. A daily and forecasted preparedness level will be determined by PSICC as outlined in the PNW Interagency Preparedness Plan.

Interagency Incident Management teams may be called upon to manage or assist the park with fires, which escape initial attack.

The FMO and the Chief Ranger are responsible for ensuring that interagency agreements are

reviewed annually and will schedule pre-season meetings with cooperators as required. Cooperative or interagency agreements facilitate the furnishing of nearby crews for firefighting and incident management.

The following agreements are with Mount Rainier NP, most need revision or updating.

- ◆ MOU between Pierce County District 23 fire and rescue and NPS/MORA, 2002
- ◆ MOA between US Army Reserve Command Ft. McPherson, GA (for Ft Lewis, WA) & MORA, 2002
- ◆ National Interagency Agreement for Fire Management between Puget Sound Interagency Coordination Center and MORA, updated 1999
- ◆ Pacific NW Wildfire Coordinating Group MOU, 1998
- ◆ Interagency Agreement for Fire Management between BLM, BIA, NPS USFW, and USFS, 1997
- ◆ Draft of Fire, Aviation and Emergency Response in the Pacific NW, 1999
- ◆ MOU for Fire Protection Services Operating Plan between the following agencies: BIA, BLM, DNR, FWS, NPS and USFS, 2002

D. ADMINISTRATIVE PROCEDURES

Financial management for the program outlined in this plan will be in accordance with Directors Order 18: Wildland Fire Management Guideline. The Fire Management Officer is responsible for the administrative procedures for all phases of the program.

Accurate and complete records are a vital part of any management program. The following permanent records and reports have been established and will be maintained at park headquarters.

1. Individual Fire Reports, DI-1202
2. Fire Atlas (including GIS data)
3. Fire Weather Records (maintained in WIMS computer system)
4. Historical Records (photographs, maps, etc., particularly of vegetative changes due to fire)
5. Fire Qualification and Training Records (maintained in SACS)
6. Fire Equipment Inventories
7. Cooperative Agreements and Memoranda of Understanding
8. Prescribed Fire Monitoring Data and Analysis.

The Fire Management Officer is responsible for maintaining permanent fire records.

Fire reports (DI-1202) will be submitted within seven days after the fire is declared out to the Boise office, by means of the SACS computer system. A case report, 10-343, will be completed for all arson or suspicious fires. Arson and suspicious cause fires

will be reported to the Communications Center, for law enforcement follow-up. If a fire related 10-343 is sent directly to the Communications Center, a copy will be forwarded to the Fire Management Office.

All fire management activities involving the recruitment of personnel, timekeeping, procurement and property management will comply with the policies and guidelines specified in Directors Order 18 and Reference Manual 18, as well as the Interagency Fire Business Management Handbook.

E. AIRCRAFT OPERATIONS

Maps of the area can be viewed by linking to the web:

[Hydrology](#)

[Perennial Lake Depths](#)

[Landing Zones](#)

Because 97 percent of the park is designated wilderness, park policy limits the use of aircraft to activities involving life or health threatening emergencies, the administration and/or protection of wilderness resources and for individually approved special purpose missions that meet the criteria defined in the Wilderness Act. Park aviation activity as it pertains to fire suppression shall be performed in accordance with applicable FAA regulations, DOI Aviation Policy (350-354 DM), Director's Order 60: Aviation Management, Aviation Policy and the Interagency Helicopter Operations Guide (IHOG).

Fixed-wing aircraft are used for detection, patrol, and observation, as well as, occasionally serving as a radio relay link between ground crews and the park's communication center during non-fire emergencies. Aircraft are obtained through commercial vendors operating under Office of Aircraft Services (OAS) or US Forest Service contracted aircraft rental agreements.

A variety of retardant aircraft are available from bases throughout the Pacific Northwest. These shared suppression resources are ordered through the PSICC, Puget Sound Interagency Coordination Center. Airtankers should normally be dispatched with a lead plane, due to the steep, mountainous terrain. Ferry and turn-around times for retardant aircraft can be lengthy and their use requires careful planning. The closest current air tanker bases are located in Redmond, OR at Moses Lake, WA.

Helicopters are used for reconnaissance, water bucket drops, and transportation of personnel on initial attack on lightning fires and shutting equipment. OAS and USFS aircraft rental agreements and contracts are maintained with commercial operators on the Olympic Peninsula, in the greater Seattle area and throughout the rest of Washington and Oregon. Type III helicopters are the most commonly used helicopter for initial attack and reconning of fires.

Military aircraft are not normally used for fire management activities. There maybe an except when emergency medical evacuation is needed and the hoist capabilities of military helicopters are required, or when there is such large fire activity within the Pacific Northwest that no commercial aircraft are available. Military medical response helicopters are obtained under a regional MAST program. MORA's communication system would dispatch these resources. Military aircraft, both helicopter and air tanker, can be utilized under special agreement with the National Interagency Fire Center during extreme fire seasons.

Because most of the park is wilderness, clearing of new helispots or improvement of natural openings is held to an absolute minimum and requires Superintendent's approval, except in life threatening situations. A location map and descriptive listing of all known improved helispots and those unimproved helispots that are utilized shall be maintained in the fire management office. Information will include a brief description of known hazards, approaches, descriptive location or nearest landmark, size, latitude and longitude and last year known utilization occurred. If at all possible, the park's wilderness values will take precedence over improving helispots. Helispots improved for an incident will be rehabilitated following the fire.

Aircraft may be used for emergency fire management purposes without prior approval from the Superintendent's office. Emergency consultation concerning impacts on threatened and endangered species may be required. As in all fire management activities, safety is a primary consideration. Qualified helicopter support personnel will be assigned to all flight operations. All employees utilizing helicopters will receive basic ground safety briefings/training, be dressed in PPE, and orientation to the aircraft.

Retardant and foam use from aircraft should be limited if at all possible, due to potential impacts on the environment. A careful balance needs to be achieved between the potential impacts and the gains as a firefighting tool.

Additional information on aircraft operations and specific procedures is contained in the aircraft section of the Fire Mobilization Plan of this plan and in the park's Aviation Management Plan.

All fire-related aircraft services should be requested through the FMO/Aviation Officer. PSICC has been granted the authority to order all aircraft for wildland fire activities.

For Type III fires, the FMO/Aviation Officer and the Comm Center will be notified by the IC that an aircraft has been ordered. Before the conclusion of the fire, the IC will forward all aviation documentation to the FMO/Aviation Officer, a DI-1 and completed OAS-23 form to the Procurement Office.

Type I and II IMT fire teams will follow their standard operating procedures and go through expanded fire dispatch.

Temporary Flight Restrictions (TFR's) are ordered through the Park's Communications Center or PSICC. The Park Aviation Officer, FMO and Chief Ranger should be notified, so as other project helicopters in the Park are not in conflict with the TFR.

Wilderness helicopter landing zones have been designated on a map which is located in the Communication Center and can be distributed to vendors. Where helispots are needed, natural openings or previously constructed locations will be used to the extent possible. Park designated helibase include: Kautz Creek, Fourth Crossing, and Ranger Field (Mount Baker-Snoqualmie National Forest).

The minimum personnel for conducting aviation fire suppression activities in the park will consist of a Helibase Manager, Helicopter Manager and Helicopter Crew Person. All personnel in helicopter and helibase management positions must meet all prerequisite training and experience standards as per Chapter 2 of IHOG.

1. Water Use in Aircraft Operations

Water is integral to all park ecosystems. Park water resources are diverse and include alpine lakes, waterfalls, glacially fed rivers, and mineral springs. The streams and rivers of Mount Rainier National Park, which have been altered very little by humans, represent outstanding examples of the original pristine aquatic ecosystems of North America. Their unique characteristics make them valuable recreational resources; but more important is the fact that these rivers and streams may serve as benchmarks for identifying changes in area environmental conditions and natural resources. The history of natural disturbance and the complex mosaics of riverine landforms have strongly shaped the development and composition of stream ecosystems emerging from the slopes of Mount Rainier.

Both glacial and non-glacial drainages originate on the slopes of Mount Rainier. The mountain has 26 major glaciers, covering 35 square miles, the largest single mountain glacial system in the contiguous 48 states. For the purposes of managing water resources of the park, nine major watersheds have been delineated. With the exception of Huckleberry Creek and a portion of the Ohanapecosh River, park rivers originate from glacial melt water. Drainage area ranges from 13,320 acres in the Puyallup watershed to 41,398 acres in the Ohanapecosh drainage.

With some exceptions (including the northern watershed of the Carbon River, southern watershed of the Nisqually River, Berry Creek, and some tributaries to Chenuis Creek) all surface waters of the park originate inside the boundary. Approximately 470 rivers and streams within Mount Rainier National Park are shown on USGS 7.5 minute quadrangles (scale 1:24,000); 383 are perennial and 84 are

intermittent. Mineral geothermal springs are found on the summit of Mount Rainier, at Longmire, and at Ohanapecosh. Cold springs also occur throughout the park.

A total of 405 lakes are shown within the park on USGS 7.5-minute quadrangles. Of these, 310 are permanent lakes, the remainder are intermittent. At approximately 123 acres and 57 feet deep, the exceptionally clear Mowich Lake is the largest and deepest lake in the park.

Ponds and their dependent organisms (amphibians, invertebrates) are the most sensitive to water level changes. Additionally, aquatic systems in MORA are naturally very low in nutrients, primarily nitrate and phosphorus compounds.

Use of helicopter bucket operations in wildland fire suppression will depend on variables such as; fire size and location, bucket capacity and helicopter capabilities and limitations. Use of fire retardant and surfactants or buckets that have been dipped in them will not be permitted. Buckets dipped in water sources outside MORA boundaries may not be dipped or discharged in sources within MORA during the same operational period in order to avoid contamination of MORA hydrologic systems.

Potential water sources will be evaluated prior to the normal fire season by NCR subject matter specialists using the best and most current information available and subject to review as conditions change throughout the fire season. The Fire Management Team will decide which sources can be utilized for the incident being evaluated. The attached map identifies potential water sources in the park.

Water from surface water sources (lakes, ponds, and streams) will be used only after evaluating potential affects to aquatic organisms. No aerial dipping from streams will be conducted since streams are often too shallow and these actions may affect listed T&E Species. Lakes and ponds may be used as aerial dipping water sources only under the following criteria:

- ◆ Lake depth must be a minimum of 7 meters.
- ◆ The aerial bucket does not contain any fire retardant (outside or inside the bucket)
- ◆ No Species of Concern or listed T&E Species are present (as noted by past amphibian or invertebrate surveys. This generally includes Cascade Frog, Western Toad, Red-legged Frog, Fenders Stonily and California Floater).

IX. FIRE RESEARCH & MONITORING

This fire monitoring program allows the national Park Service to document basic information, to detect trends, and to ensure that parks meet their fire and resource management objectives. From identified trends, park staff can articulate concerns, develop hypotheses, and identify specific research projects to develop solutions to problems. The goals of the program described here are to:

- Document basic information for all wildland fires, regardless of management strategy
- Document fire behavior to allow managers to take appropriate action on all fires that either:
 - ♦ Have the potential to threaten resource values
 - ♦ Are being managed under specific constraints, such as a prescribed fire or fire use
- Document and analyze both short-term and long-term prescribed fire effects on vegetation
- Establish a recommended standard for data collection and analysis techniques to facilitate the sharing of monitoring data
- Follow trends in plant communities where fire effects literature exists, or research has been conducted
- Identify areas where additional research is needed

This Fire Monitoring Handbook (FMH) describes the procedures for this program in National Park Service units.

Table I. Wildland fire management strategies and Recommended Standard (RS) monitoring levels

Management Strategy	RS Level
Suppression: All management actions are intended to extinguish or limit the growth of the fire.	1. Environmental 2. Fire Observation -Reconnaissance -Fire Conditions
Wildland Fire Use: Management allows a fire started by a natural source to burn as long as it meets prescription standards.	1. Environmental 2. Fire Observation -Reconnaissance -Fire Conditions
Prescribed Fire: Management uses intentionally set fires as a management tool to meet management objectives.	1. Environmental 2. Fire Observation -Reconnaissance -Fire Conditions 3. Short-term Change 4. Long-term change

Environmental monitoring provides the basic background information needed for decision-making. Parks may require unique types of environmental data due to the differences in management objectives and/or their fire environments. The following types of environmental data can be collected:

- Weather
- Fire Danger Rating

- Fuel Conditions
- Resource Availability
- Concerns and Values to be Protected
- Other Biological, Geographical or Sociological Data

Reconnaissance monitoring provides a basic overview of the physical aspects of a fire event. On some wildland fires this may be the only level 2 data collected. Collect data on the following variable on all fires.

- Fire Cause (Origin) and Ignition Point
- Fire Location, and Size
- Logistical Information
- Fuels and Vegetation Description
- Current and Predicted Fire Behavior
- Potential for Further Spread
- Current and Forecasted Weather
- Resources or Safety Threats and Constraints
- Smoke Volume and Movement

The second portion on Level 2 monitoring documents fire conditions. Data on the following variables can be collected for all fires. The park's fire management staff should select appropriate variables, establish frequencies for their collection, and document these standards in your burn plan or Wildland Fire Implementation Plan-Stage II: Short-term Implementation Action and Wildland Fire Implementation Plan-Stage III: Long-term Implementation Actions.

- Topographical Variables
- Ambient Conditions
- Fuel Model
- Fire Characteristics
- Smoke Characteristics
- Holding Options
- Resource Advisor Concerns

DIRECT

1	FUEL MODEL	2	TIMBER (GRASS AND UNDERSTORY)				
2	1-HR FUEL MOSTURE, %	5.0	7.0	9.0	11.0	13.0	15.0
							17.0
3	10-HR FUEL MOISTURE, %	10.0	15.0	20.0			
4	100-HR FUEL MOISTURE, %	10.0	15.0	20.0			
5	LIVE HERBACEOUS MOISTURE, %	80.0	130.0	180.0			
7	MIDFLAME WINDSPEED, MI/H	2.0	3.0	10.0	14.0	18.0	
8	TERAIN SLOPE, %	.0	20.0	40.0	60.0	80.0	
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0					
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)				

DIRECT

1	FUEL MODEL	2	TIMBER (GRASS AND UNDERSTORY)				
2	1-HR FUEL MOSTURE, %	7.0					
3	10-HR FUEL MOISTURE, %	9.0					
4	100-HR FUEL MOISTURE, %	10.0					
5	LIVE HERBACEOUS MOISTURE, %	80.0					
7	MIDFLAME WINDSPEED, MI/H	2.0	6.0	10.0	14.0	18.0	
8	TERAIN SLOPE, %	.0	20.0	40.0	60.0	80.0	
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0					
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)				

FM2

High to Extreme Conditions

RATE OF SPREAD, CH/H						(V4.4)
MIDFLAME WIND (MI/H)	TERRAIN SLOPE, %					
	.0	20.0	40.0	60.0	80.0	
2.0	9.	11.	18.	29.	45.	
6.0	50.	52.	59.	70.	86.	
10.0	123.	125.	132.	143.	159.	
14.0	225.	228.	235.	246.	262.	
18.0	356.	358.	365.	376.	392.	

DIRECT

1	FUEL MODEL	8	CLOSED TIMBER LITTER					
2	1-HR FUEL MOSTURE, %	7.0						
3	10-HR FUEL MOISTURE, %	9.0						
4	100-HR FUEL MOISTURE, %	10.0						
7	MIDFLAME WINDSPEED, MI/H	2.0	6.0	10.0	14.0	18.0		
8	TERAIN SLOPE, %	.0	20.0	40.0	60.0	80.0		
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0						
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)					

**Fuel Model 8
High to Extreme Conditions**

RATE OF SPREAD, CH/H		(V4.4)				
MIDFLAME WIND (MI/H)	TERRAIN SLOPE, %					
	.0	20.0	40.0	60.0	80.0	
2.0	1.	1.	1.	2.	3.	
6.0	2.	3.	3.	4.	4.*	
10.0	4.*	4.*	4.*	4.*	4.*	
14.0	4.*	4.*	4.*	4.*	4.*	
18.0	4.*	4.*	4.*	4.*	4.*	

* MEANS YOU HIT THE WIND LIMIT.

DIRECT

1	FUEL MODEL	10	TIMBER (LITTER AND UNDERSTORY)					
2	1-HR FUEL MOSTURE, %	7.0						
3	10-HR FUEL MOISTURE, %	9.0						
4	100-HR FUEL MOISTURE, %	10.0						
6	LIVE WOODY MOISTURE, %	100.0						
7	MIDFLAME WINDSPEED, MI/H	2.0	6.0	10.0	14.0	18.0		
8	TERAIN SLOPE, %	.0		40.0	60.0	80.0		
		20.0						
		0						
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0						
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)					

FM10
High to Extreme Conditions

RATE OF SPREAD, CH/H						(V4.4)
MIDFLAME WIND (MI/H)	TERRAIN SLOPE, %					
	.0	20.0	40.0	60.0	80.0	
2.0	3.	3.	5.	8.	11.	
6.0	10.	11.	12.	15.	19.	
10.0	21.	21.	23.	25.	29.	
14.0	33.	33.	35.	38.	41.	
18.0	47.	47.	49.	52.	55.	

DIRECT

- | | | | |
|----|---|-------|---------------------------|
| 1 | FUEL MODEL | 5 | BRUSH, 2 FT (60 CM) |
| 2 | 1-HR FUEL MOSTURE, % | 7.0 | |
| 3 | 10-HR FUEL MOISTURE, % | 9.0 | |
| 6 | LIVE WOODY MOISTURE, % | 100.0 | |
| 7 | MIDFLAME WINDSPEED, MI/H | 2.0 | 6.0 10.0 14.0 18.0 |
| 8 | TERAIN SLOPE, % | .0 | 40.0 60.0 80.0 |
| | | 20. | |
| | | 0 | |
| 9 | DIRECTION OF WIND VECTOR
DEGREES CLOCKWISE FROM
UPHILL | .0 | |
| 10 | DIRECTION OF SPREAD
CALCULATIONS
DEGRESS CLOCKWISE FROM
UPHILL | .0 | (DIRECTION OF MAX SPREAD) |

Fuel Model 5
High to Extreme Conditions

RATE OF SPREAD, CH/H						(V4.4)
MIDFLAME WIND (MI/H)	TERRAIN SLOPE, %					
	.0	20.0	40.0	60.0	80.0	
2.0	6.	7.	10.	16.	23.	
6.0	24.	25.	28.	34.	41.	
10.0	48.	49.	52.	57.	65.	
14.0	75.	77.	80.	85.	93.	
18.0	107.	108.	111.	117.	124.	

DIRECT

1	FUEL MODEL	5	BRUSH, 2 FT (60 CM)			
2	1-HR FUEL MOSTURE, %	10.				
3	10-HR FUEL MOISTURE, %	11.				
6	LIVE WOODY MOISTURE, %	100.0				
7	MIDFLAME WINDSPEED, MI/H	2.0	6.0	10.0	14.0	18.0
8	TERAIN SLOPE, %	.0		40.0	60.0	80.0
		20.				
		0				
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0				
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)			

FM 5

Moderate, "average"

TERRAIN SLOPE (%)	RATE OF SPREAD (CH/H)	HEAT PER UNIT AREA (BTU/SQFT)	FIRELINE INTENSITY (BTU/FT/S)	FLAME LENGTH (FT)	REACTION INTENSITY (BTU/SQT/M)	EFFECT WIND (MI/H)
.0	11.	226.	44.	2.6	990.	6.0
20.0	11.	226.	46.	2.6	990.	6.2
40.0	13.	226.	52.	2.8	990.	6.8
60.0	15.	226.	62.	3.0	990.	7.8
80.0	19.	226.	77.	3.3	990.	9.0

DIRECT

1	FUEL MODEL	2	TIMBER (GRASS AND UNDERSTORY)			
2	1-HR FUEL MOSTURE, %	10.0				
3	10-HR FUEL MOISTURE, %	11.0				
4	100-HR FUEL MOISTURE, %	12.0				
5	LIVE HERBACEOUS MOISTURE, %	80.0				
7	MIDFLAME WINDSPEED, MI/H	6.0				
8	TERAIN SLOPE, %	.0	20.0	40.0	60.0	80.0
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0				
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)			

Fuel Model 2**Moderate**

TERRAIN SLOPE (%)	RATE OF SPREAD (CH/H)	HEAT PER UNIT AREA (BTU/SQFT)	FIRELINE INTENSITY (BTU/FT/S)	FLAME LENGTH (FT)	REACTION INTENSITY (BTU/SQFT/M)	EFFECT WIND (MI/H)
.0	42.	430.	332.	6.5	3118.	6.0
20.0	44.	430.	348.	6.6	3118.	6.2
40.0	50.	430.	394.	7.0	3118.	6.6
60.0	60.	430.	471.	7.6	3118.	7.3
80.0	73.	430.	578.	8.4	3118.	8.2

DIRECT

1	FUEL MODEL	8	CLOSED TIMBER LITTER
2	1-HR FUEL MOSTURE, %	10.0	
3	10-HR FUEL MOISTURE, %	11.0	
4	100-HR FUEL MOISTURE, %	12.0	
7	MIDFLAME WINDSPEED, MI/H	6.0	
8	TERAIN SLOPE, %	.0	20.0 40.0 60.0 80.0
9	DIRECTION OF WIND VECTOR DEGREES CLOCKWISE FROM UPHILL	.0	
10	DIRECTION OF SPREAD CALCULATIONS DEGRESS CLOCKWISE FROM UPHILL	.0	(DIRECTION OF MAX SPREAD)

FM 8**Moderate**

TERRAIN SLOPE (%)	RATE OF SPREAD (CH/H)	HEAT PER UNIT AREA (BTU/SQFT)	FIRELINE INTENSITY (BTU/FT/S)	FLAME LENGTH (FT)	REACTION INTENSITY (BTU/SQFT/M)	EFFECT WIND (MI/H)
.0	2.	165.	6.	1.0	810.	6.0
20.0	2.	165.	6.	1.0	810.	6.2
40.0	2.	165.	7.	1.1	810.	6.9
60.0	2.	165.	9.	1.2	810.	8.0
80.0	3.	165.	9.	1.3	810.	8.3*

* MEANS YOU HIT THE WIND LIMIT

DIRECT

1	FUEL MODEL	8	CLOSED TIMBER LITTER
2	1-HR FUEL MOSTURE, %	10.0	
3	10-HR FUEL MOISTURE, %	11.0	
4	100-HR FUEL MOISTURE, %	12.0	
6	LIVE WOODY MOISTURE, %	100.0	
7	MIDFLAME WINDSPEED, MI/H	6.0	
8	TERAIN SLOPE, %	.0	40.0 60.0 80.0
		20.0	
		0	

- 9 DIRECTION OF WIND VECTOR .0
DEGREES CLOCKWISE FROM
UPHILL
- 10 DIRECTION OF SPREAD .0 (DIRECTION OF MAX SPREAD)
CALCULATIONS
DEGRESS CLOCKWISE FROM
UPHILL

FM 10

Moderate

TERRAIN SLOPE (%)	RATE OF SPREAD (CH/H)	HEAT PER UNIT AREA (BTU/SQFT)	FIRELINE INTENSITY (BTU/FT/S)	FLAME LENGTH (FT)	REACTION INTENSITY (BTU/SQT/M)	EFFECT WIND (MI/H)
.0	9.	1159.	199.	5.1	5326.	6.0
20.0	10.	1159.	210.	5.3	5326.	6.2
40.0	11.	1159.	241.	5.6	5326.	6.9
60.0	14.	1159.	293.	6.1	5326.	8.0
80.0	17.	1159.	366.	6.8	5326.	9.4

Some fire-related and forest ecology research has been compiled on Mount Rainier National Park. C.F. Brockman , in a M.S. Thesis in 1931, wrote *Forests and timber types of Mount Rainier National Park*, which was expanded by Jerry F. Franklin, *et al*, in the 1979 work *The Forest Communities of Mount Rainier National Park*. J. A. Henderson compiled research for his PhD thesis on the park's subalpine meadows and in 1973 published *Composition, distribution, and succession of subalpine meadows in Mount Rainier National Park* .

The most comprehensive study on park-wide fire effects is found in *Fire and Other Disturbances of the Forests in Mount Rainier National Park*, published in 1982 by Miles Hemstrom and Jerry Franklin, which documents fire disturbances dating back to 1200 A. D.

Information was lacking on fire history and fire effects in the subalpine zone, as was noted by James Agee in his 1981 24 page paper *Fire Research Needs in National Park System Areas of Oregon and Washington*. Agee suggested that a high priority should be placed on monitoring effects of fire in the subalpine zone. In 1989, Mark H. Huff, then a Post-doctoral Research Associate at the University of Washington, along with University Of Washington Professor James Agee and Michael Gracz and Mark Finney, Graduate Research Assistants, wrote *Fuel and fire Behavior Predictions in Subalpine Forests of Pacific Northwest National Parks*. As part of NPS Cooperative Agreement CA-9000-8-007, of which the earlier work was a part, Huff and Agee in 1991 published *Subalpine Forest Dynamics After Fire in the Pacific Northwest National Parks*, which expanded on Huff's 1988 research in the park which produced *Mount Rainier: Fire and Ice*, published in *Park Science* 8 (3).

The information, data and results of these works have been incorporated in the Fire Management Plan, and will be used in preparedness planning, monitoring activities, setting prescription limits and determining appropriate management responses to wildland fire incidents.

- The Chief of Natural and Cultural Resources will coordinate relevant research requests, or results, to address fire management issues on which to base fire management decisions.

- Fire records will be made available to researchers to assist their studies.
- Researchers may be permitted to participate in fire management activities provided they are adequately trained, equipped, and physically fit to insure their personal safety.
- Short/Long term monitoring programs to assess accomplishments and to determine effect of management activities on cultural/natural resources.
- Monitoring protocols (similar to NPS Fire Monitoring Handbook)
- Fire Monitoring Plan (RM18, Chapter 11)

DECISION TO MONITOR

The Superintendent's decision to monitor a prescribed fire or wildland fire used for resource benefits will be based on work sheets found in the *Wildland Fire Implementation Plan* (WFIP), in particular the *Decision Criteria Checklist*, in the *Complexity Analysis* and in the *Periodic Fire Assessment* (samples of all documents are located in the appendix) and a recommendation by the FMO.

PURPOSE OF MONITORING

The primary responsibility of the monitoring team is to gather, document and assess fire weather parameters, fire behavior and fire effects. Information is then transferred to the Prescribed Fire Boss to analyze the situation, inform management, implement management actions, and to track prescription achievement.

Daily verification that the natural wildland fire is within prescription will be documented on the *Fire Situation Analysis* and *Fire Decision Record* (both part of the WFIP signed by the Superintendent. This daily review will include analysis of contingency reserves for suppression efforts, if required. If the current situation exceeds any of the prescription limits, the wildland fire use status will be converted to a wildland fire and an appropriate management (suppression) response will be taken.

Monitoring of wildland fires at Mount Rainier National Park is intended to provide information for quantifying and predicting fire behavior and its ecological effects on park resources while building an historical record. Monitoring measures the parameters common to all fires: fuels, topography, weather and fire behavior. This information will be very useful later in fine-tuning the prescribed fire program, and monitoring natural successional stages of naturally ignited wildland fires.

Fires that do not meet the objectives of the fire management program and incident objectives are suppressed. Even here, observation of fire behavior and fire effects may be appropriate and potentially valuable in mapping and documenting the growth of the fire with present and expected fire behavior information. Monitoring can serve as a precursor to invoking appropriate management response by determining if the fire is in prescription and assessing protection and fire use objectives.

During the life of a prescribe or wildland fire (whether under a suppression response, wildland fire use), monitoring provides for mapping, weather, site and fuel measurements and direct observation of fire characteristics such as flame length, rate of spread and intensity. Operational monitoring provides a check to ensure that the fire remains in prescription and serves as a basis for evaluation and comparison of management actions in response to measured, changing fire conditions, and changes such as fuel conditions species composition, slope and weather.

All fires will be staff and observed to some degree regardless of size. The Chief Ranger/FMO will establish specific fire information guidelines to update intelligence about each fire.

The Chief Ranger/FMO will ensure that qualified personnel are dispatched to monitor fires. Personnel will be dispatched for the length of time there is a need for on-site information on the fire's status. The most efficient utilization of personnel is to combine specifically trained monitoring personnel with experienced fire suppression personnel.

FIRE MONITORING GUIDELINES

The NPS *Fire Monitoring Handbook* will be the source document for monitoring procedures. Monitoring protocols must be reviewed and approved at the regional office level before receiving funding.

The monitoring team will consist of a minimum of two persons. One member will be minimally qualified as a Fire Weather/Behavior Specialist II. The other member will have had Basic Fire Fighting and Fire Behavior training and experience in operation of monitoring equipment. Protocol will be based on that in the *Western Region Fire Monitoring Handbook* and the *NPS Fire Monitoring Handbook*.

Documentation in writing and photographs of fire parameters, as outlined in NPS-18, will be taken a minimum of once per day at 1400 PDT. More frequent documentation may be required, dependent upon individual fire situations. When aerial monitoring is selected, the on-site standards may be adjusted appropriately.

The *Fire Monitoring Guide* specifies the variables to be measured, the methods to be used, the equipment required and the organization and responsibilities of the monitoring team.

X. PUBLIC SAFETY

Firefighter and public safety is the first priority in all fire management activities.

Natural wildland fire prescription limits are designed to insure public safety.

Safety of visitors, employees, families and incident personnel will be the number one responsibility given to all Incident commanders, or Incident Management Teams, (IMT).

Superintendent may close all of the park or portions of it, (including roads and trails) when either wildfire or prescribe natural fire poses an imminent threat to public safety.

The park will implement a notification system to inform visitors and residents of all fire activities on a daily basis through normal communication channels. Fire activities report will be updated daily or when significant changes warrant in order to inform park personnel of any potential threat.

Areas of fire activity will be clearly signed at trailheads and along roadways, and backcountry personnel will inform visitors obtaining permits for backcountry use of the exact location of fire activities.

Law enforcement personnel, of any fire, which poses the threat of burning outside the parks boundaries, will immediately notify residents adjacent to the park.

Signs warning of possible smoke on the road will be placed on the Parks roads if smoke produced during wildland fires creates a safety concern. Roads may be closed and escorts/conveys established if visibility on the highways or park roads is significantly impaired. Efforts need to be coordinated with State and local law enforcement jurisdictions and the DOT if applicable.

XI. PROTECTION OF SENSITIVE RESOURCES

The following infrastructures would require protection, especially in the Historic Longmire District. See appendix four for further details.

LOCATION	NUMBER OF BUILDINGS
Nisqually	14
Kautz Creek	2
Longmire	56
Paradise	11
Ohanapecosh	5
White River	6
Sunrise	11
Carbon River	3

59 contributing structures Park wide.

XII. FIRE CRITIQUES AND ANNUAL PLAN REVIEW

The Fire Management Team, coordinated by the Chief Ranger or FMO, will conduct a critique of each fire or fire episode (multiple fires at the same time) in accordance with NPS-18. An interagency investigation team will review all entrapments and fire shelter deployments. All personnel assigned to any wildland fire will receive a performance evaluation. The evaluation can be verbal or written commensurate with the complexity of the incident. Critique reports will be filed with the fire record.

The Chief Ranger will be responsible for completing an annual fire summary report. The report will contain the number of fires by type, acres burned by fuel type, cost summary (prescribed burns and wildland fires) personnel utilized, and fire effects.

The FMO will coordinate an annual review of the Fire Management Plan and associated procedures, agreements, etc. The review will be initiated January 1st and revisions will be coordinated and implemented by May 1st.

XIII. CONSULTATION AND COORDINATION

This plan will be coordinated with the following park divisions and state or federal agencies:

National Park Service, Mount Rainier National Park

Superintendent's Office

Jonathan Jarvis, past Superintendent, current Regional Director

Dave Uberuaga, current Superintendent

Donna Rahier, Secretary

Natural and Cultural Resources

Roger Andrascik, Chief

Greg Burtchard, Archeologist/Cultural Resources Specialist

Susan Dolan, Historical Landscape Architect

Brian Hasebe, Aquatic Resources Biotech

Julie Hover, Restoration Technician

Laurie Kurth, Plant Ecologist

Ellen Myers, Wildlife Biotech

Jim Petterson, former Wildlife Ecologist

Rose Rumball-Petre, Environmental Protection Specialist

Barbara Samora, Biologist

Darin Swinney, Geographic Information Specialist

Maintenance

Dan Blackwell, Chief

Eric Walkinshaw, Project Manager

Ellen Gage, Historical Architect

Visitor Use and Resource Protection

Jill Hawk, Chief

Alison Robb, Supervisory Ranger / Fire and Aviation Officer

Lea Asman, Park Ranger, Fire plan assistant

Steve Klump, Supervisory Park Ranger, Wilderness Coordinator

Uwe Nehring Supervisory Park Ranger, East District Supervisor

Dave Langley (former Park Ranger and Fire Management Officer)

Interpretation and Education

Maria Gillett, Chief

Sheri Forbes, Assistant Chief

Anne Doherty, Education Specialist

National Park Service, Pacific West Region

Rick Smedley, Regional Fire Planner

Elizabeth Wadell, Air Resource Specialist

National Park Service, Denver Service Center

Adrienne A. Anderson Brian Mitchell, Air Resources

Washington State Historic Preservation Office

Steve Mathison

U.S. Fish and Wildlife Service

Carolyn Scafidi

National Marine Fisheries Service

Chris Clemons (former NMFS biologist)

Matt Logenbaugh

Washington State Department of Natural Resources

Chuck Frame, South Puget Sound Region Fire Operation Manager

Mark Gray

Washington State Department of Ecology

Frank Van Haren, Air Quality Program

Gifford Pinchot National Forest

Mike Matarrese, Fire Staff Officer and FMO

Mount Baker-Snoqualmie National Forest

Gary Castellane, Staff Officer and South Zone FMO

Wenatchee National Forest

Jim Bailey, FMO

Washington State Department of Natural Resources

Chuck Frame, Aviation and Fire Officer

Puget Sound Inter Agency Communications Center (PSICC)

Bob Reese, Emergency Operation Center Supervisor

Tribal Contacts

Tribe	Contact	Address	Telephone	Facsimile
Muckleshoot Indian Tribe	John Daniels, Jr., Chairman	39015-172nd Ave., SE, Auburn, WA 98092-9763	(253) 939- 3311	(253) 939- 5311
	Melissa Calvert, Wildlife & Cultural Resource Program Director	39015 172nd Ave SE Auburn, WA. 98092	(360) 802- 2202 ext. 105	(360) 802- 2242
Puyallup Tribe of Indians	Herman Dillon, Sr. , Chairman	2002 E. 28th St., Tacoma, WA 98404- 4996	(253) 597- 6200	(253) 597- 6200
	Jeffrey Thomas, Forest Resources and Cultural Program	6824 Pioneer Way East Puyallup WA 98371	(253) 845- 9225	
Nisqually Indian Tribe	John Simmons, Chairman	4820 She-Nah-Num Dr. SE, Olympia, WA 98513	(360) 456- 5221	(360) 438- 8618
	Leonard Squally, Historical Committee Chair		(360) 456- 5221	(360) 438- 8618
Confederated Tribes and Bands of the Yakama Nation	Robert Wahpat, Chair	P.O. Box 151, Toppenish, WA 98948- 0151	(509) 865- 5121	(509) 865- 5528
	Carroll Palmer, Director, Division of Natural Resources	same	(509) 865- 5121	(509) 865- 6850
	Johnson Meninick, Director of Cultural Resources		(509) 865- 5121	(509) 865- 4664
Squaxin Island Tribe	David Lopeman, Chairman	SE 70, Squaxin Lane, Shelton, WA 98584-9200	(360) 426- 9781	(360) 426- 6577
	Ronda Foster, Director, Heritage & Culture Committee		(360)426- 9781 ext. 3504	
Cowlitz Indian Tribe	John Barnett, Cowlitz Tribal Chairman	P.O. Box 2547 Longview, WA 98632	(360)577- 8140	
	Dave Burlingame, Chair, Cultural Committee	1205 Grant Ave S #R- 303, Renton, WA 98055	(425) 255- 7303	

Appendices